

RIT

Preparing you for an
**outstanding
educational
experience**



**Undergraduate Bulletin
2022-23**

Rochester Institute of Technology 2022-23 Academic Calendar

† The Add/Drop period is the first seven class days of the fall, spring, and full summer terms, excluding Sundays and holidays.

* Tentative spring semester and summer term schedule. RIT reserves the right to update the spring and summer schedule.

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Fall Semester (2221)

August 22
Day, evening, and online classes begin
First day of Add/Drop period †

August 27
Saturday classes begin

August 29
Last day of Add/Drop period †

August 30
First day to drop from classes with a grade of "W"

September 5
Labor Day—No Classes

October 10-11
Fall Break—No Classes

November 4
Last day to drop from classes with a grade of "W"

November 23
No Classes
University closes at 2pm

November 24-25
Thanksgiving Holiday
University closed

December 5
Last day, evening, and online classes

December 6
Reading Day

Dec. 7, 8, 9, 12, 13, 14
Final exams

December 16
Final grades due

December 15–January 16
Break between fall and spring semesters

Spring Semester (2225)

January 16
Martin Luther King Jr. Day (no classes)

January 17
Day, evening, and online classes begin
First day of Add/Drop period †

January 21
Saturday classes begin

January 24
Last day of Add/Drop period †

January 25
First day to drop from classes with a grade of "W"

March 12-19
Spring Break (no classes)

April 7
Last day to drop from classes with a grade of "W"

May 1
Last day, evening, and online classes

May 2
Reading Day

May 3, 4, 5, 8, 9, 10
Final exams

May 12
Final grades due

May 12-13
Convocation and
Commencement Ceremonies

May 15-17
Break between spring semester
and summer term

12-week Summer Term (2228)

May 18
Day, evening, and online classes begin
First day of Add/Drop period †

May 20
Saturday classes begin

May 25
Last day to Add/Drop classes †

May 26
First day to drop from classes with a grade of "W"

May 29
Memorial Day (no classes)
University closed

July 4
Independence Day observed
University closed

July 27
Last day to drop from classes with a grade of "W"

August 9
Last day, evening, and online classes

August 10
Reading Day

August 11, 14, 15
Final exams

August 17
Final grades due

August 18-27
Break between summer term and fall semester

Short Session I Summer Term (2228)

May 18
Day, evening, and online classes begin
First day of Add/Drop period †

May 22
Last day to Add/Drop classes †

May 23
First day to drop from classes with a grade of "W"

May 29
Memorial Day (no classes)
University closed

June 21
Last day to drop from classes with a grade of "W"

June 28
Last day of classes

June 29, 30
Final exams

July 3
Final grades due

Short Session II Summer Term (2228)

July 3
Day, evening, and online classes begin
First day of Add/Drop period †

July 4
Independence Day observed (no classes)
University closed

July 6
Last day to Add/Drop classes †

July 7
First day to drop from classes with a grade of "W"

August 2
Last day to drop from classes with a grade of "W"

August 9
Last day, evening, and online classes

August 10
Reading Day

August 11, 14, 15
Final exams

August 17
Final grades due

College of Art and Design

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Course numbering: RIT courses are generally referred to by their alphanumeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100-299), upper division (300-599), or graduate level (600 and above).

Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.

Interdisciplinary Art and Design

IDEA-150 Topics in Art and Design

This course will introduce students to selected topics in the areas of art and design. The course content will vary according to topic. A topic course description will be published each term the course is offered. Students may take this course multiple times with different topics. **Lecture 3, Credits 1 - 3 (Fall, Spring, Summer)**

IDEA-151 Studio Topics in Art and Design

This course will introduce students to selected topics in the areas of studio practices in art and design. The course content will vary according to course topic, techniques and methodologies. A topic description will be published each term the course is offered. Students may take this course multiple times with different topics. **Studio 6, Credits 1 - 3 (Fall, Spring, Summer)**

IDEA-216 Calligraphy

This course will introduce students to a calligraphic hand for the purpose of acquiring a comprehensive understanding of letterform design and application for personal and professional application. Students will learn to letter using traditional and current tools and techniques. This course is open to anyone who is interested in learning more about lettering, the historical evolution of calligraphy as a precursor to typography and about past, present and emerging styles and practitioners in the fields of lettering, calligraphy and typography. (This course is available to RIT degree-seeking undergraduate students.) **Studio 5, Credits 3 (Fall, Spring)**

IDEA-221

Design for Non-Majors I

This course is a structured, cumulative introduction to the basic elements and principles of two-dimensional design for non-majors. This course will focus on the development of both a visual and verbal vocabulary as a means of exploring, developing and understanding 2D compositions. The course addresses a wide variety of media, tools, techniques both traditional and technological, and theoretical concepts to facilitate skill development and experimentation with process. This course may help in building a portfolio. (This course is open to all undergraduate students except those in FNAS-BFA, ILLM-BFA, ILLS-BFA, NMDE-BFA, GRDE-BFA, IDDE-BFA, INDE-BFA, 3DDG-BFA, CCER-BFA, GLASS-BFA, METAL-BFA, WOOD-BFA, PHIMAG-BFA, STAR-BFA and PHTILL-BFA.) **Studio 5, Credits 3 (Fall, Spring)**

IDEA-222

Design for Non-Majors II

This course is the second semester of a sequential, introduction to the basic elements and principles of two-dimensional design. Organized to create a broad introductory experience this course will build upon the visual and verbal vocabulary, media, techniques, skill development. This course will also focus on the comprehensive exploration of color theory as well as dealing with conceptualization and more advanced issues related to problem solving. This course may help in building a portfolio. (Prerequisite: IDEA-221 or equivalent course and undergraduate student standing in any major except STAR-BFA, FNAS-BFA, ILLM-BFA, ILLS-BFA, NMDE-BFA, GRDE-BFA, IDDE-BFA, INDE-BFA, 3DDG-BFA, and CCER-BFA.) **Studio 5, Credits 3 (Fall, Spring)**

IDEA-223

Garden Sculpture

This course is designed for students to create outdoor sculpture working with either natural or weather-resistant materials. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 2, Credits 3 (Spring)**

IDEA-223

Garden Sculpture

This course is designed for students to create outdoor sculpture working with either natural or weather-resistant materials. (This course is available to RIT degree-seeking undergraduate students.) **Studio 3, Credits 3 (Spring)**

IDEA-242

Comics: Image and Text in Popular Culture

An interdisciplinary course in comics and related media that blend image and text. By reading and discussing a range of comics and comics-related works, from 19th-century lithographs and newspaper comic strips, to superhero comics and works of art that make use of comics, we will learn both how to analyze comics and how the medium of comics emerged in and remains vital to popular culture. Through the use of interdisciplinary methods and resources in art history, communications and journalism, literary studies, material culture studies, rhetoric, sociology, and visual culture studies, we will also explore the aesthetic, cultural, historical, and global significance of comics. **Lecture 3, Credits 3 (Fall, Spring)**

IDEA-251

Visual Storytelling for the Graphic Novel

This course is an intensive investigation into the graphic novel as a medium for artistic practice. Designed for students interested in the art of storytelling through graphic novels. Students will explore composing a story, developing a pace through layout and composition, learning the fundamental tools of sequential illustration and then unifying the entire structure with the intent of creating a graphic novel. **Studio 5, Credits 3 (Fall, Spring)**

IDEA-301

Foundations of Project Development

This course is designed to help students develop and refine project ideas and write a successful project proposal. Students will develop ideation techniques and research skills necessary to create a written proposal that describes, in detail, their intention and process. Students will learn how to develop the infrastructure necessary to successfully see their idea through to completion. (Prerequisites: Completion of First Year Writing (FYW) requirement is required prior to enrolling in this class.) **Lecture 3, Credits 3 (Fall or Spring)**

IDEA-305

College of Art and Design Alumni: Community and Beyond

This course will explore the rich community of alumni from the College of Art and Design. Students in this course will participate in interviews, artist talk and virtual tours as a means to introduce students to the expansive community of RIT CAD alumni and beyond. Students who enrolled in this course in First Class Academy during summer 2020 cannot retake this course. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

IDEA-310

Why Photography Matters: Rochester Edition

What do Rochester, RIT, and your TikTok feed have to do with each other? This course explores the significance of Rochester in the global development of photography, the failure of Kodak and the rise of digital and social media, and how we're all more engaged with the photographic world than ever before. Students who enrolled in this course in First Class Academy during summer 2020 cannot retake this course. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

College of Art and Design

- IDEA-342** **Global Comics**
A course on comics and comics cultures outside of the United States. Comics are a global medium, and the history of comics varies across national and international contexts. We will investigate and study different traditions of comics across the globe. The course will focus on a range of global comics, such as bande dessinées in France and Belgium, fumetti in Italy, manga in Japan, and cómics in Spain. All comics will be read in English translation. **Lecture 3, Credits 3 (Fall)**
- IDEA-344** **Popular Genre Studies in Comics and Related Media**
This course focuses on a popular genre in the comics medium. The history of the genre is explored as it developed in cartooning and comics, as well as in related media such as animation, film, games, prose, television, and toys. Genres may include Comedy, Crime, Fantasy, Funny Animals, Horror, Mystery, Romance, Science Fiction, Superhero, or Western. Check course schedule for the specific topic during any semester. **Lecture 3, Credits 3 (Spring)**
- IDEA-550** **Experimental Workshop**
This course will focus on implementing and developing interdisciplinary design projects. The specific topics for this course will vary each time it is taught but may be limited to repeatability. The topic is determined by the instructor. Technical, cultural, and human-centered aspects will be covered through a series of projects. Students will participate in short, deep-dives and extended group projects with a range of design problems, goals, tools, and procedures. Activities include branding, physical prototyping, fabrication, and digital product design. This course can be taken multiple times but individual topics must be different. **Lecture 3, Credits 3 (Fall, Spring, Summer)**
- IDEA-590** **Travel Seminar: Topic**
This course will provide students with an intensive seminar experience in art, craft, design, photography, film or animation while traveling internationally. Topics will vary depending on the faculty member or members leading the study abroad program associated with the course. A description will be published for each iteration of the course. This course can be taken multiple times, but individual topics must be different. Admission to the course is based on application through RIT Global and instructor permission. Students may not enroll in or withdraw from the course independently. Additional fees are required for this course. **Lecture 3, Credits 3 (Fa/sp/su)**
- IDEA-591** **Travel Studio: Topic**
This course is designed to give students an intensive educational experience in an applied creative discipline while traveling internationally. Course topics will vary depending on the faculty member or members leading the study abroad program associated with the course. A description will be published for each iteration of the course. This course can be taken multiple times but individual topics must be different. Admission to the course is based on application through RIT Global and instructor permission. Students may not enroll in or withdraw from the course independently. Additional fees are required for this course. **Studio 6, Credits 3 (Fa/sp/su)**
- ITDI-015** **Design in Dessau**
This is a full-time, 12 unit course for matriculated RIT students wishing to take approved courses at the Anhalt University of Applied Sciences in Dessau. Enrollment will give the students official status at RIT and allow them to take courses at the host institution. These courses will be chosen by agreement between an RIT faculty adviser and a faculty sponsor in the host school. Requests for participation must be initiated at least six months in advance to allow for completion of institute and international paperwork. (Enrollment in this course requires permission from the department offering the course.) **Equivalent 12, Credits 0 (Spring)**
- ITDI-101** **Honors Leadership**
Designed to give students in the honors program out-of-classroom learning opportunities. All students are required to keep a journal, attend pre-departure meetings, and present their project at the end of the course. Each student will develop their own project in consultation with the faculty member based on their academic field and the location of the course. (This course is restricted to Undergraduate College of Art and Design Honors students.) **Lecture 20, Credits 3 (Spring)**
- ITDI-151H** **Honors First-Year Seminar: Representing the City**
In this course, students will draw from different disciplines—art, design, urban studies, history, and literature among them—to explore the representational possibilities of the city. How have different cultures defined cities through representation? How do cities express meaning to their inhabitants? How can cities represent ideas, and how are cities represented in turn? Topics will include ideal city plans, cartography, spatial experience, topography, wayfinding, diagrams, and artistic representation. Student experiences will include creating walking tours within Rochester and designing and presenting “ideal” cities of their own. (This class is restricted to students in the Honors program.) **Lecture 3, Credits 3 (Fall)**
- ITDI-211** **Drawing for Non-Majors**
This class is devoted to developing basic skills in drawing. Formal art elements, mark making, observational skills, and personal expression will be stressed. Students will engage in issues of representation and abstraction through relationships of marks, lines and other graphic notations. (This course is open to all undergraduate students except those in FNAS-BFA, ILLM-BFA, ILLS-BFA, NMDE-BFA, GRDE-BFA, IDDE-BFA, INDE-BFA, 3DDG-BFA, CCER-BFA, GLASS-BFA, METAL-BFA, WOOD-BFA, PHIMAG-BFA, STAR-BFA and PHTILL-BFA.) **Studio 5, Credits 3 (Fall, Spring)**
- ITDI-226** **Creating Artist Books**
This course focuses on preparing students with the tools needed to create an artist book. Emphasis will be placed on the exploration of materials and ideas. The end product will be a finished artist book. Creative expression and technical experimentation will be encouraged. The course will culminate with the students publicly presenting their process and resulting artwork. (This class is open to undergraduate students in CAD except those with majors in FNAS-BFA, ILLM-BFA, ILLS-BFA, or STAR-BFA.) **Studio 5, Credits 3 (Fall, Spring)**
- ITDI-231** **Introduction to Cartooning**
This course is devoted to an intensive investigation into the language of cartooning as a narrative medium. Focus will be on the function of visual images (and then images in sequence) to dispense information. Each week a new aspect of graphic storytelling will be discussed, allowing for more narrative and emotional range. Students will devote the last third of the course to a project of their own. Students will draw and create dynamic stories through image making. (This course is restricted to UGRD-CAD Major students.) **Studio 5, Credits 3 (Fall, Spring)**
- ITDI-233** **Typeface Design**
Exploration of calligraphic letterforms, typographic history, and practical production with an emphasis on developing concepts, nomenclatures and techniques involved in the design of a digital typeface. An understanding of basic typography and calligraphy is needed. Course can be repeated for a second time with advanced coursework assigned. (This course is available to Undergraduate College of Art and Design students with at least 3rd year standing with permission of Instructor.) **Lab 2, Credits 3 (Spring)**
- ITDI-233** **Typeface Design**
Exploration of calligraphic letterforms, typographic history, and practical production with an emphasis on developing concepts, nomenclatures and techniques involved in the design of a digital typeface. An understanding of basic typography and calligraphy is needed. Course can be repeated for a second time with advanced coursework assigned. (This course is available to Undergraduate College of Art and Design students with at least 3rd year standing with permission of Instructor.) **Lecture 2, Credits 3 (Spring)**
- ITDI-236** **Figure Drawing for Non-Majors**
This course will introduce students to figure drawing, with a focus on the nude figure. This studio course will offer students the opportunity to develop traditional life drawing techniques such as dynamic line quality, visual perception and contemporary approaches to figure drawing. **Fee: A materials fee is required for this course** (Prerequisites: FDTN-111 or ITDI-211 or SOFA-108 or equivalent course.) **Studio 5, Credits 3 (Fall, Spring)**
- ITDI-239** **Figure Painting**
This class is structured to explore materials and techniques in order to paint the human form. Theory and practice of color and drawing, as well as other resources, will be used to develop an understanding of how to portray the figure. Traditional and contemporary approaches to figurative painting are utilized in producing figure paintings. (This class is open to all undergraduate students except for those in the FNAS-BFA or STAR-BFA major.) **Studio 6, Credits 3 (Fall, Spring)**
- ITDI-246** **Painting and Collage**
Students will be encouraged to experience and explore painting and collage processes and methods in this studio-based course. A study of the history, methods and materials of painting and collage will be presented and explored. Students establish strategies toward solving problems of composition, materiality and ideas related to successful imaging making. (This course is restricted to UGRD-CAD Major students.) **Studio 5, Credits 3 (Fall, Spring)**
- ITDI-248** **Sketchbook Artists Designers**
This course will facilitate the use of sketchbooks as an innovative visualization tool for artists and designers. Students will complete assignments by drawing, conducting research and exploring onsite reference gathering. Exploration of subjects and environments support the creation of visual reference material in the form of a sketchbook journal. Material documented in the sketchbook will then provide visual reference for more complete artwork or design work. (This class is open to undergraduate students in CAD except those with majors in ILLS-BFA.) **Studio 5, Credits 3 (Fall, Spring)**

ITDI-256**Web Design for Artists**

This course is an introduction to the planning, design, and production of interactive art projects that are web based. Students will be introduced to web design concepts and principles in site design, page design, graphical user interface design, and usability. The course will include instruction in building pages and websites that support students in promoting their artwork through web based representation and social media. Students will be encouraged to explore highly structured as well as highly experimental approaches to merging content with the design of interactive sites. The course will also incorporate social-cultural issues in digital art making. (Prerequisite: FDTN-112 or FDTN-122 and FDTN-122 or FDTN-222 or equivalent courses.) **Lab 6, Credits 3 (Fall, Spring)**

ITDI-300**Honors Travel Seminar**

Designed to give students intensive educational experiences involving travel abroad. Actual focus of course will be determined by faculty proposing each topic outline, and relate to destination. A subtopic course description will be published each term the course is offered and may have limited repeatability. This course however can be repeated. (This class is restricted to CAD students YR 3-4 in the Honors program.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

ITDI-301**Introduction to 3D Digital Creation**

This course is an introduction to the creation of three-dimensional art and design in the digital realm. The course focuses on the development of visual and verbal vocabulary as a means of exploring, developing, and understanding composition and motion with digital geometry and in virtual spaces in three-dimensional software. (This course is restricted to UGRD-CAD Major students.) **Studio 6, Credits 3 (Fall, Spring)**

ITDI-310**Honors Travel Studio and Seminar**

Designed to give students intensive educational experiences involving travel abroad. Actual focus of course will be determined by faculty proposing each topic outline and relate to destination. A subtopic course description will be published each term the course is offered and may have limited repeatability. This course however can be repeated. (This class is restricted to CAD students YR 3-4 in the Honors program.) **Lecture 1, Credits 3 (Fall, Spring, Summer)**

ITDI-310**Honors Travel Studio and Seminar**

Designed to give students intensive educational experiences involving travel abroad. Actual focus of course will be determined by faculty proposing each topic outline and relate to destination. A subtopic course description will be published each term the course is offered and may have limited repeatability. This course however can be repeated. (This class is restricted to CAD students YR 3-4 in the Honors program.) **Studio 4, Credits 3 (Fall, Spring, Summer)**

ITDI-311**Advanced Drawing**

Drawing is one of the most immediate and powerful forms of expression in the visual arts. Because it is so adaptable, many have used drawing for their most dynamic explorations, from installation art to underground comic books. Using both traditional and experimental drawing techniques, students will explore personal and contemporary drawing strategies. Students will seek to develop meaningful personal imagery, while refining drawing skills along the way. Experimentation with a wide range of media techniques and working methods including transfers, montages, collage, wash drawings and digital inputs students will also explore various ways of gathering and integrating research materials, including photography. Development of your own drawing series will be an intense culmination of the semester. We will look at how contemporary issues like digital technology, sampling, and photography have impacted how drawings are made, how they are used and how they are understood in today's art world. (Prerequisite: FDTN-112 or FDTN-212 or ITDI-211 or equivalent courses.) **Studio 5, Credits 3 (Fall, Spring)**

ITDI-316**Digital Art and Mixed Media**

This course offers students the opportunity to explore the creative potential of digital art through the exploration of both traditional and digital media. Students will be expected to utilize and combine skills learned in traditional and digital media to provide engaging and innovative artworks. (Prerequisite: Student standing in an undergraduate major in CAD and completion of FDTN-111 and FDTN-121 or equivalent courses.) **Studio 5, Credits 3 (Fall, Spring)**

ITDI-366**Letterpress Design**

This course will explore the art and technique of Letterpress Printing in the 21st Century. Emphasis will be placed on typography and typesetting using lead and wood type. The history of letterpress printing; its demise and rebirth in modern times, as well as wood block and linoleum block printing will be covered. Hands-on methods of combining both types of design and hand set typographic layouts in various mediums and sizes integrated. All aspects of the letterpress printing process will be covered: setting type correctly, tying forms, press make-ready and maintenance, printing, ink mixing, paper, some book binding and finishing. Students will also explore digital design for letterpress printing using the Box Car Base. This course may be offered off campus. This course may be retaken up to two times with advanced course work. ****Fee: There is a lab fee to cover personal equipment and supplies** (This course is restricted to undergraduate students in CAD with at least 2nd year standing.) Studio 5, Credits 3 (Spring)**

ITDI-550**Topics in Artisanal Materials and Processes**

An introduction into selected artisanal processes and techniques used in the creation of utilitarian items and/or artwork. Topics will be determined by faculty teaching the course, and may include titles such as: Lighting Design with Wood and Glass, Ceramic Slip-Casting for Production, Blade Design and Fabrication, etc. A subtopic course description will be developed for each new topic. This shell course can be repeated, but the topics themselves cannot. **Studio 5, Credits 3 (Fall, Spring, Summer)**

ITDI-560**Design Visualization**

This course will provide an opportunity for students to develop and refine their conceptual and problem-solving abilities through illustration-driven design. Students will elevate and refine their ability to deliver ideas via illustration. Students will identify a challenge in their respective fields of study that can be overcome by their creative problem-solving abilities and illustration talents. The projects will be consistent with the work a freelance illustrator/designer would be challenged to create. At the completion of this course, students will be able to create comprehensive projects where the primary imagery is illustrative. (Prerequisites: GRDE-106 or IDDE-207 or INDE-203 or NMDE-111 or NMDE-112 or equivalent course.) **Lab 3, Credits 3 (Spring)**

ITDI-560**Design Visualization**

This course will provide an opportunity for students to develop and refine their conceptual and problem-solving abilities through illustration-driven design. Students will elevate and refine their ability to deliver ideas via illustration. Students will identify a challenge in their respective fields of study that can be overcome by their creative problem-solving abilities and illustration talents. The projects will be consistent with the work a freelance illustrator/designer would be challenged to create. At the completion of this course, students will be able to create comprehensive projects where the primary imagery is illustrative. (Prerequisites: GRDE-106 or IDDE-207 or INDE-203 or NMDE-111 or NMDE-112 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

School for American Crafts

Ceramics

CCER-124**Clay Studio Survey**

This course will introduce students to ceramics as an artform. Subjects will include basic hand-building techniques, a variety of finishing processes, surface development, as well as historical and contemporary perspectives. Through assigned projects, students will demonstrate their enhanced understanding of ceramics. ****Fee: a course fee applied via student account. ** Studio 5, Credits 3 (Fall or Spring)**

CCER-128**Josiah Wedgwood's Legacy**

This course will examine the evolution of 18th-century European ceramics under the influence of Josiah Wedgwood's innovative spirit. Considered widely to be the father of modern marketing and manufacturing, potter, social activist, and politician Josiah Wedgwood built an empire from utilitarian objects underpinned by complex relationships between ceramics, technology, and culture. Through a combination of research-based exploration and hands-on, immersive learning, students will develop an understanding of the impact ceramics manufacturing had on such phenomena as social dynamics, social class, business practices, technologies that spurred advanced manufacturing, division of labor, and Neoclassical style. At the conclusion of this course, students will understand the significance of clay within history, the impact of pottery on culture in the age of imperialism, and how Wedgwood's innovations endure today in the contemporary practices of studio pottery, ceramic manufacturing, and art. ****This course requires a lab fee.** (This course is available to undergraduate students.) Studio 5, Credits 3 (Fall or Spring)**

CCER-206**Ceramic Sculptural Processes**

This introductory course is designed to give the student an understanding of a variety of basic processes involved in creating hand-built ceramic objects, sculpture, and pottery vessels. There will be an emphasis on manipulating clay using forming techniques such as pinch, coil, solid, and slab building. Students will learn surface finishing processes such as textures and surface carving and decorating with slips, glaze applications, and gain a perspective on material science. The historical, cultural, and technical concerns of ceramics will be explored. These experiences will broaden the students' perspectives of ceramic art and its relationship to the larger world of art. ****Fee: A materials fee is required for this course, and an additional course fee applied via student account** (Prerequisites: FDTN-111 or CCER-124 or CCER-128 or equivalent course.) Studio 6, Credits 3 (Fall)**

CCER-211

Thrown Vessel Forms

This course will introduce the student to beginning wheel forming techniques used in the ideation and creation of utilitarian vessels. There will be a focus on form, function and surface development. Students will engage in a variety of finishing processes for surface development as well as slip and glaze application. Students will gain an understanding of a variety of firing techniques, as well as an introduction to material science to better understand the properties of clay and glaze composition. The historical, cultural, and technical concerns of ceramics will be explored. These experiences will broaden the students' perspectives of ceramic art and its relationship to the larger world of art. Students will be expected to research areas of interest within ceramic history. **Fee: A materials fee is required for this course, and an additional course fee applied via student account** (Prerequisites: FDTN-111 or CCER-124 or CCER-128 or equivalent course.) **Studio 6, Credits 3 (Fall or Spring)**

CCER-301

Ceramics Junior I

During this semester, students will be introduced to industrial forming methods of ceramics. Students will develop drawings / proposals and a strategy for production. The students will then produce molds for slip casting as a means to produce multiples of a consistent quality. Students will develop their own slip castings clay bodies, slips and glazes for cone 6-oxidations / reduction firings. **Fee: A materials fee is required for this course.** (Prerequisites: (CCER-206 or CCER-207) and (CCER-211 or CCER-212) or equivalent courses.) **Studio 12, Credits 6 (Fall)**

CCER-302

Ceramic Junior II

The purpose of this course will investigate the properties of the sculptural ceramic vessel to develop the student's personal aesthetic and visual thinking. Assigned projects will evoke the student's imagination and ceramic vocabulary through the relationship between concept, design, form, surface embellishment, and choice of firing methods and glazes. A systematic investigation of ceramic clays, raw materials, glaze materials, glaze composition, and glaze calculation will be presented in lecture and assignments. **Fee: There is a lab fee required for this course** (Prerequisites: CCER-301 or equivalent course.) **Studio 12, Credits 6 (Spring)**

CCER-399

Ceramics Part-Time Co-op

Cooperative Education will provide ceramic students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in CCER-BFA or STAR-BFA with department permission.) **CO OP, Credits 0 (Fall, Spring, Summer)**

CCER-498

Ceramics Undergraduate Internship

The Ceramics Internship will provide students with the option to work in the ceramics field. Students may apply for internships to businesses based on the availability of positions and business job needs. Students must obtain permission of an instructor and complete the Internship Permission Form to enroll. Registration with co-op and placement office also required. (Prerequisites: This class is restricted to students in CCER-BFA or STAR-BFA with department permission.) **Internship, Credits 1 - 6 (Fall, Spring)**

CCER-499

Ceramics Co-op

Cooperative Education will provide Ceramic students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in CCER-BFA or STAR-BFA with department permission.) **CO OP, Credits 0 (Fall, Spring, Summer)**

CCER-501

Ceramic Practice

Students will continue advanced research into their technical, aesthetic and conceptual understanding of ceramics. In this course, students create a proposal which will guide their research and practice. Working with faculty to explore individual directions, students will produce finished artwork for their senior capstone exhibition. **Fee: A materials fee is required for this course, and an additional course fee applied via student account** (Prerequisites: CCER-511 or equivalent course.) **Studio 6, Credits 3 (Fall or Spring)**

CCER-502

Ceramics Senior II

This is the second of a two-semester course in which seniors will produce a project and must be able to offer evidence of qualification as a candidate for the baccalaureate degree to be approved by the faculty. The proposed body of work should develop self-expression and a personal direction in clay. The work should express the goals and ideas as well as the materials and processes that are stated in the proposal. Emphasis is on expression and technical foundation needed to establish the role of the body of work. The goal is to produce a coherent body of work of high standard which must be exhibited at a venue at the end of the school year. **Fee: There is a lab fee required for this course** (Prerequisites: CCER-501 or equivalent course.) **Studio 12, Credits 3 (Spring)**

CCER-507

Mold Mechanisms

This course will concentrate on the fundamentals of plasterwork, mold-making, and slip-casting. Students will first engage in a series of directed exercises to build proficiency, and then apply what they've learned to the production of complex mold systems. By way of experimentation, students will broaden conceptualization of positive and negative spatial relationships while developing problem solving capacity. Supporting information relating to historical, cultural, and scientific concerns will be provided to broaden the students' perspectives of ceramic art, design, and industry, as well as its relationship to the larger world of art. **Fee: A materials fee is required for this course, and an additional course fee applied via student account** (Prerequisites: CCER-124 or CCER-128 or FDTN-131 or SCUL-201 or SCUL-269 or equivalent courses.) **Studio 6, Credits 3 (Fall or Spring)**

CCER-511

Ceramic Processes

Students will build upon their experience to further advance the technical, aesthetic and conceptual understanding of ceramic form and surface. This course will work from a set of prompts which will provide parameters for building individual bodies of work in a variety of different forming processes. Students will work from conceptual and contextual prompts to gain insight and build skills with advanced forming processes, surface investigation, idea development, and documentation. **Fee: A materials fee is required for this course, and an additional course fee applied via student account** (Prerequisites: CCER-206 or CCER-211 or CCER-507 or CCER-512 or equivalent course.) **Studio 6, Credits 3 (Fall or Spring)**

CCER-512

Installation and Digital Ceramics

Students will engage in advanced techniques to explore installation as a format for artwork. Students will further advance their technical, aesthetic and conceptual understanding of sculpture through ceramic processes and installation. This intermediate course will provide a focused studio experience with specific sculptural forming processes, such as large-scale building, the multiple, and digital techniques. By the end of the term, students will have planned and applied their concepts through research, experimentation, and installation. **Fee: There is a materials fee required for this course and an additional course fee applied via student account. ** (Prerequisites: (CCER-311 or SCUL-501 or SCUL-511) and (CCER-124 or CCER-206 or CCER-207 or CCER-211 or CCER-212) or equivalent courses.) **Studio 6, Credits 3 (Spring)**

CCER-513

Thrown Sculptural Forms

This course will introduce students to intermediate forming techniques used in the ideation and creation of both utilitarian and sculptural vessels. There will be a focus on form, surface development, and aesthetics. The student will gain experience with firing methodologies. The students will also work with material science to better understand clay and glaze chemistry. The historical, cultural, and technical concerns of ceramics will be explored. These experiences will broaden the students' perspectives of ceramic art and its relationship to the larger world of art. Students will be expected to research areas of interest within ceramic history or the field at large. This course will introduce students to the skills that are necessary for creating a variety of forms through assigned projects. **Fee: A materials fee is required for this course, and an additional course fee applied via student account** (Prerequisites: FDTN-111 or CCER-124 or CCER-128 or equivalent course.) **Studio 6, Credits 3 (Fall or Spring)**

CCER-530

Ceramics 3 Credit Elective

This is a class specifically designed for non-majors covering the fundamental techniques and aesthetics of working with clay. Topics covered include the forming techniques, clay mixing, basic properties of clay, glazing and firing techniques and fundamental understanding of historical and contemporary practices and applications. The course includes prescribed projects based on the number of studio hours. **Fee: There is a lab fee required for this course** (This course is available to RIT degree-seeking undergraduate students.) **Studio 5, Credits 3 (Fall, Spring)**

CCER-599

Ceramics Independent Study

Ceramics Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser will propose a course of study. Ceramics students must obtain permission of an instructor and complete the Independent Study Form to enroll. (Prerequisites: This class is restricted to students in CCER-BFA or STAR-BFA with department permission.) **Ind Study, Credits 1 - 6 (Fall, Spring)**

Furniture Design

CWFD-124 **Woodworking / Furniture Design Studio Survey**
This open elective course will introduce students to the furniture design studio and to wood as creative material. The content of the course will focus on the introduction of tools and techniques in woodworking and the creative design process. Students will learn basic skills and safety procedures for using hand tools and machine tools. **Fee: There is a materials fee required for this course and an additional course fee applied via SFS bill. See course notes for course fee information.** **Studio 5, Credits 3 (Fall or Spring)**

CWFD-213 **Introduction to Woodworking and Furniture Design**
This is a course required for majors and open to non-majors at RIT, covering beginning wood-working techniques, and the design process as it relates to the material. Topics include the use of select hand tools, woodworking power tools, the basic properties of wood as a material, and the fundamental processes of wood fabrication. The course includes prescribed projects based on in-class contact hours. In this course students will develop the fundamentals of working with wood. **Fee: There is a materials fee required for this course and an additional course fee applied via student account. ** (Prerequisites: FDTN-112 or FDTN-212 or FDTN-122 or FDTN-222 or FDTN-132 or FDTN-232 or FDTN-141 or IDDE-102 or ILLS-206 or ILLS-209 or INDE-102 or CWFD-124 or equivalent course.) **Studio 6, Credits 3 (Fall or Spring)**

CWFD-302 **Furniture Design Junior II**
This is the second of a two-semester sequential class covering intermediate techniques and aesthetics of woodworking. Topics covered include the design process, advanced hand and power tool joinery, intermediate machine processes, veneering, drawer, door and solid wood carcass design and construction and CAD/CAM/CNC technology. **Fee: There is a lab fee required for this course** (Prerequisites: CWFD-301 or equivalent course.) **Studio 12, Credits 6 (Spring)**

CWFD-399 **Furniture Design Part-Time Co-op**
Cooperative Education will provide Furniture Design students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in WOOD-BFA or STAR-BFA with department permission.) **CO OP, Credits 0 (Fall, Spring, Summer)**

CWFD-498 **Furniture Design Internship**
The Furniture Design Internship will provide students with the option to work in the furniture design or furniture manufacturing field. Students may apply for internships to businesses based on the availability of positions and business job needs. Students must obtain permission of an instructor and complete the Internship Permission Form to enroll. (Prerequisites: This class is restricted to students in WOOD-BFA or STAR-BFA with at least 2nd year standing and department permission.) **Internship, Credits 1 - 6 (Fall, Spring)**

CWFD-499 **Furniture Design Co-op**
Cooperative Education will provide Furniture Design students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in WOOD-BFA or STAR-BFA with department permission.) **CO OP, Credits 0 (Fall, Spring, Summer)**

CWFD-501 **Furniture Design Senior I**
This is the first of a two-semester sequential class covering advanced techniques and aesthetics of woodworking. Topics covered include the design process, advanced woodworking processes, conceptually driven design and construction, development of a capstone project proposal and CAD/CAM/CNC.**Fee: There is a lab fee required for this course** (Prerequisites: CWFD-302 or equivalent course.) **Studio 12, Credits 6 (Fall)**

CWFD-502 **Furniture Design Senior II**
This is the second of a two-semester sequential class covering advanced techniques and aesthetics of woodworking. Topics covered include the design process, advanced woodworking processes, professional presentations, conceptually driven design and construction, and the creation of a capstone body of work. **Fee: There is a lab fee required for this course** (Prerequisites: CWFD-501 or equivalent course.) **Studio 12, Credits 3 (Spring)**

CWFD-506 **Furniture Design: Table Design and Construction**
This course covers intermediate woodworking techniques associated with furniture design and construction. Students will investigate the functional and aesthetic considerations of table design through ideation and conceptual development. Topics include the properties of wood as a material, design development through drawing and model-making, the safe use and care of hand tools such as chisels and saws, portable power tools, and the use of stationary power tools. Students will be introduced to wood joinery best suited for table construction.**Fee: A materials fee is required for this course and an additional course fee will be applied via student account** (Prerequisites: CWFD-213 or CWFD-124 or CWFD-MN or WOOD-AOS students or equivalent course.) **Studio 6, Credits 3 (Fall)**

CWFD-507 **Furniture Design: Bench Design and Construction**
This course covers intermediate woodworking techniques associated with furniture design and construction. With a focus on aesthetics, structure, and functionality, students will design and construct furniture for seating such as stools and benches. Topics covered will include intermediate joinery techniques, lathe turning, hand and power shaping, and the safe use of the multi-router, router table and rotary carving tools. These processes will foster a focus on craftsmanship, technical knowledge and design development. **Fee: There is a materials fee required for this course and an additional course fee applied via student account. ** (Prerequisites: CWFD-213 or CWFD-124 or CWFD-MN or WOOD-AOS students or equivalent course.) **Studio 6, Credits 3 (Spring)**

CWFD-511 **Furniture Design: Wood Carving**
This course will provide students with fundamental techniques necessary to design and fabricate refined hand carved vessels and other wooden objects. Participants in this course will gain an understanding of the inherent properties of wood, identifying assets and limitations of the material as they design and build. Students will develop skills to formalize individual design ideas for presentation, planning and construction. Topics will include lumber selection, the safe and proper use of machinery and portable power tools, the care and use of gouges, spokeshaves, and other sharp-edged hand tools, as well as sanding and wood finishing, and will support the focus on craftsmanship, technical knowledge and design development. **Fee: There is a materials fee required for this course and an additional course fee applied via SFS bill. See course notes for course fee information. ** (Prerequisites: CWFD-213 or CWFD-124 or CWFD-MN or WOOD-AOS students or equivalent course.) **Studio 6, Credits 3 (Fall)**

CWFD-512 **Furniture Design: Box and Cabinet Design and Construction**
This course covers the techniques associated with the design and construction of wooden boxes and cabinets. Students will design and build a number of functional pieces giving careful consideration to the inherent properties of the material. Course topics will include lumber selection and processing, joinery layout and corner joint construction, as well as the safe use of hand and power tools. The class will also introduce lid, drawer, and hinging options, and intermediate hand finishing techniques. At the completion of this course, students will have the technical knowledge and design development to create artwork with the highest level of craftsmanship. **Fee: A materials fee is required for this course and an additional course fee will be applied via student account** (Prerequisites: CWFD-213 or CWFD-124 or CWFD-MN or WOOD-AOS students or equivalent course.) **Studio 6, Credits 3 (Spring)**

CWFD-530 **Furniture Design 3 Credit Elective**
This is a class designed for non-majors, covering a fundamental introduction to techniques and aesthetics of woodworking. Topics covered include the use of select hand tools and wood-working power tools, wood as a material, its basic properties and fundamental processes of wood fabrication. The course includes a prescribed project based on five in-class contact hours. **Fee: There is a lab fee required for this course** (This course is available to RIT degree-seeking undergraduate students.) **Studio 5, Credits 3 (Fall, Spring)**

CWFD-599 **Furniture Design Independent Study**
Furniture Design Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser will propose a course of study. Furniture Design students must obtain permission of an instructor and complete the Independent Study Form to enroll. (Prerequisites: This class is restricted to students in WOOD-BFA or STAR-BFA with instructor permission.) **Ind Study, Credits 1 - 6 (Fall, Spring)**

Glass

CGLS-124 **Glass Studio Survey**
This open elective course will introduce students to the glass studio and to glass as a creative material. The content of the course will focus on introductory tools, techniques, and experimentation. The students will learn basic skills and safety procedures for the Hot Shop, Flame Shop, Kiln Shop, and the Cold Shop. **Fee: There is a materials fee required for this course and an additional course fee applied via SFS bill. See course notes for course fee information.** **Studio 5, Credits 3 (Fall or Spring)**

College of Art and Design

- CGLS-206** **Molten Glass Practice**
This course will introduce students to basic glass working processes in the hot glass studio. Solid and blown techniques are introduced as ways to activate ideas through molten glass. Students will learn introductory processes of finishing and further manipulating annealed glass in the cold shop. Students will build technical understanding and material comprehension in the application of these skills through assigned projects motivated by current themes in contemporary art. **Fee: A course fee applied via student account. ** **Studio 6, Credits 3 (Fall)**
- CGLS-211** **Mold and Kiln Glass Practice**
This course will introduce students to basic mold making and glass working processes in the kiln studio. Fusing, slumping, and casting techniques will be covered as ways to activate ideas through kiln-formed glass. In addition, basic processes of finishing glass in the cold shop will also be introduced. Students will build technical understanding and material comprehension in the application of these skills within self-directed projects motivated by prompted themes found within contemporary art. There is a required out-of-class work time in glass studio at a minimum of 6-9 hours per week. **Fee: A materials fee is required for this course and an additional course fee will be applied via student account** **Studio 6, Credits 3 (Fall)**
- CGLS-301** **Glass Junior I**
This course, the first of a two-semester sequence will cover intermediate glass working techniques and processes. The course will build upon previous glass working competencies to introduce and investigate issues of contemporary art. Glass will be used as a vehicle to emphasize student growth in the processes of ideation, research, experimentation, and conversation in support of further developing each student's personal making practice. ** Fee: There is a lab fee for materials required for this course** (Prerequisites: CGLS-206 and CGLS-207 and CGLS-211 and CGLS-212 or equivalent courses.) **Studio 12, Credits 6 (Fall)**
- CGLS-302** **Glass Junior II**
This course is the second of a two-semester sequence will cover intermediate glass working techniques and processes. The course will build upon previous glass working competencies and provide opportunities that introduce and investigate issues of contemporary art. Glass will be used as a vehicle to emphasize student growth in the processes of ideation, research, experimentation and conversation in support of further developing each student's personal making practice. ** Fee: There is a lab fee for materials required for this course** (Prerequisites: CGLS-301 or equivalent course.) **Studio 12, Credits 6 (Spring)**
- CGLS-307** **Hot Phenomena Glass Practice**
This hot glass course will allow students to discover and/or rediscover fundamental solid and blown techniques through a fresh lens of instruction and ideas. The cold shop will be an additional studio where students will learn to use the equipment to further their projects. Contemporary themes surrounding material experimentation, problem-solving and making a mess will be the springboards for prompted assignments. **Fee: A course fee applied via student account. ** **Studio 6, Credits 3 (Spring)**
- CGLS-312** **Kinetic Glass Practice**
This course will introduce students to basic flame working processes. Solid working techniques with borosilicate glass will be covered as ways to activate ideas about making glass move. Basic processes of finishing and further manipulating annealed glass in the cold shop will also be introduced. Students will build technical understanding and material comprehension in the application of these processes. Students will develop projects motivated by themes regarding mechanics, the experimental, and absurdity. ** Fee: A course fee applied via student account** **Studio 6, Credits 3 (Spring)**
- CGLS-399** **Glass Part-Time Co-op**
Cooperative Education will provide Glass students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission (Prerequisites: This class is restricted to students in GLASS-BFA or STAR-BFA with department permission.) **CO OP, Credits 0 (Fall, Spring, Summer)**
- CGLS-498** **Glass Internship**
Glass Internship is a course that offers students the chance to take advantage of professional opportunities as they arise during their graduate studies. This course is structured on the basis of the individual student's needs, interests and background preparation as they may be determined through faculty counseling. This course leads to the master's thesis, proposed by the student and approved by the faculty. Registration with co-op and placement office is required. (Prerequisites: This class is restricted to students in GLASS-BFA or STAR-BFA with department permission.) **Internship, Credits 1 - 6 (Fall, Spring)**
- CGLS-499** **Glass Co-op**
Cooperative Education will provide Glass students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in GLASS-BFA or STAR-BFA with department permission.) **CO OP, Credits 0 (Fall, Spring, Summer)**
- CGLS-501** **Glass Senior I**
This course, the first of a two-semester sequence, will aid the student in beginning the development of their capstone. This semester's creative output is self-directed. Guidance and instruction is in response to the students' written and verbal proposals for research to conduct over the year. This research culminates in a cohesive body of work the following Spring. Ideas generated from topical readings and group discussion will be used to advance material comprehension and technical understanding in innovative approaches to studio practice. A chosen thematic focus relevant to issues of contemporary art will influence individual student development and the course's conversation through various assignments and group activities. ** Fee: There is a lab fee for materials required for this course** (Prerequisites: CGLS-302 or equivalent course.) **Studio 12, Credits 6 (Fall)**
- CGLS-502** **Glass Senior II**
This course, the second of a two-semester sequence, will aid the student in finalizing the development of their capstone, a self-directed project guided in response to the students' research and technical needs. The student is guided by their written and verbal proposal for a cohesive body of work and required to present it in a capstone exhibition within the term. Ideas generated from topical readings and group discussion will be used to advance material comprehension and technical understanding in innovative approaches to studio practice. A chosen thematic focus relevant to issues of contemporary art will influence individual student development and the course's conversation through various assignments and group activities. ** Fee: There is a lab fee for materials required for this course** (Prerequisites: CGLS-501 or equivalent course.) **Studio 12, Credits 3 (Spring)**
- CGLS-503** **Glass Practice**
This course is designed for students to build an intermediate technical relationship with glass process and apply them to prompted studio projects and assignments. Course content will include an informative mix of studio instruction to support skill acquisition in the hot shop, kiln shop, cold shop, and flame shop which will equip the student to generate artwork in support of their personal interests, questions, and curiosities in unique instances of studio crossover. The exploration of technique will also lend way to practices of technical exercise, sample collecting, and failure-spurring experimentation of both material and process to further inform the student what their unique relationship to glass can be as they develop the cornerstones of their making practice and artistic identity. ** Fee: There is a course fee applied via student account** (Prerequisites: CGLS-206 and CGLS-307 and CGLS-211 and CGLS-312 or equivalent course.) **Studio 6, Credits 3 (Fall, Spring)**
- CGLS-530** **Glass Processes**
This course will introduce the beginner to the glass studio and to glass as a creative material. ** Fee: There is a lab fee required for this course** (This course is available to RIT degree-seeking undergraduate students.) **Studio 6, Credits 3 (Fall, Spring)**
- CGLS-599** **Independent Study-Glass**
Glass undergrad independent study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser will propose a course of study. Glass undergraduate independent study students must obtain permission of an instructor and complete the Independent Study Permission Form to enroll. (Prerequisites: This class is restricted to students in GLASS-BFA or STAR-BFA with instructor permission.) **Ind Study, Credits 1 - 6 (Fall, Spring)**

Metals and Jewelry Design

CMTJ-124

Metals and Jewelry Studio Survey

This course is an introduction to the field of metals and jewelry design. It is designed to develop fundamental skills in working with nonferrous metal through various metalsmithing processes and techniques. The course will focus on the understanding of materials and processes for the fabrication of small objects and jewelry. Decorative surface texture, pattern and forming techniques will be studied as well as cold connection, soldering and hollow construction. The course will also explore the use of alternative materials as a medium to create work along an assigned theme or conceptual framework. The student will learn to evaluate new techniques, materials and concepts to succeed in more advanced Studio Arts course. **Fee: There is a materials fee required for this course and an additional course fee applied via SFS bill. See course notes for course fee information. ** Studio 5, Credits 3 (Fall or Spring)

CMTJ-206

Methods and Practice

This course will introduce students to basic jewelry hand tools. Students will learn about composition and working properties of ferrous and non-ferrous metals, which will serve as primary materials. This course will provide in-depth instruction on fundamental design and fabrication techniques. Students will acquire technical understanding and demonstrate the comprehension of materials through assigned projects motivated by current themes in contemporary art and jewelry design. Students will be instructed on the proper use and maintenance of the metals shop. Students will be required to conduct research on a historical metals topic, write a paper and give a presentation. **Fee: There is a lab fee required for this course** (Prerequisites: FDTN-112 or FDTN-212 or FDTN-122 or FDTN-222 or FDTN-132 or FDTN-232 or FDTN-141 or IDDE-102 or ILLS-206 or ILLS-209 or INDE-102 or equivalent course.) Studio 6, Credits 3 (Fall)

CMTJ-207

Design, Fabrication, and Forming

This course will introduce the student to intermediate silver soldering and gem setting. Students will explore forming techniques used in the fabrication of jewelry and functional objects. Students will acquire technical understanding and demonstrate the comprehension of materials through assigned projects motivated by current themes in contemporary art and jewelry design. Students will be instructed on the proper use and maintenance of the metals shop. Students will be required to conduct research on a historical metals topic, write a paper, and give a presentation. Fee: There is a lab fee for materials required for this course. (Prerequisites: CMTJ-124 or CMTJ-206 or CMTJ-211 or equivalent course.) Studio 6, Credits 3 (Spring)

CMTJ-211

Design and Fabrication

Students will engage in fundamental design and fabrication techniques, materials, and processes within the broad historical and social context of jewelry design and metalworking. Working with precious and non-precious metals, students will learn traditional metal and jewelry methods of construction and fabrication. Students will acquire technical understanding and demonstrate the comprehension of materials through assigned projects motivated by current themes in contemporary art and jewelry design. Students will be instructed on the proper use and maintenance of the metals shop. Students will be required to conduct research on an historical metals topic, write a paper and give a presentation. **Fee: There is a lab fee required for this course** (Prerequisites: FDTN-112 or FDTN-212 or FDTN-122 or FDTN-222 or FDTN-132 or FDTN-232 or FDTN-141 or IDDE-102 or ILLS-206 or ILLS-209 or INDE-102 or equivalent course.) Studio 6, Credits 3 (Fall)

CMTJ-112

Fabrication, Casting, and Mold Making

The course focuses on the fundamentals of jewelry and metal design. Current styles and formal characteristics of jewelry and metal objects will be studied through a series of design problems. Students will learn casting and mold-making techniques for small scale objects and jewelry. Instruction will include vacuum assisted and centrifuge casting, sand casting, wax carving, replica casting, and silicone rubber mold making. Students will acquire technical understanding and demonstrate the comprehension of materials through assigned projects motivated by current themes in contemporary art and jewelry design. Students will be instructed on the proper use and maintenance of the metals shop. Students will be required to conduct research on a historical metals topic, write a paper, and give a presentation. Fee: There is a lab fee for materials required for this course. (Prerequisites: CMTJ-124 or CMTJ-206 or CMTJ-211 or equivalent course.) Studio 6, Credits 3 (Spring)

CMTJ-301

Metals and Jewelry Design Junior I

This course continues instruction in jewelry and hollowware rendering, chasing and repoussé, and tool making, providing in-depth instruction on advanced design and fabrication techniques. Through the use of kumboo 24k gold and bi-metal overlay technique, acid-etching and hydraulic die forming, students are introduced to jewelry and hollowware design and production methods. This course also introduces intermediate gem setting, identification and gemstone anatomy. Students will obtain instruction on the proper use and maintenance of the metals shop. Students will be taught advanced machine skills, hand skills and tools. Students will be required to conduct research on a historical metals topic, write a paper and give a presentation. **Fee: There is a materials fee required for this course and an additional course fee applied via SFS bill. See course notes for course fee information. ** (Prerequisites: CMTJ-206 or CMTJ-207 or CMTJ-211 or CMTJ-212 or equivalent course.) Studio 12, Credits 6 (Fall)

CMTJ-302

Metals and Jewelry Design Junior II

This course continues instruction in intermediate and advanced metal fabrication and introduces students to welding techniques and their application to metals and jewelry design. Students will be introduced to design alternatives for the creation of complex jewelry objects that may incorporate both metal and alternative materials as a means of design development and expression through artwork. Students will reflect appropriate application of material and process with regard to contemporary jewelry trends and historical context. Additionally, students will examine the ways in which materials and techniques influence meaning. Students will obtain instruction on the proper use and maintenance of the metals shop. Students will be taught advanced machine skills, hand skills and tools. Students will be required to conduct research on a historical metals topic, write a paper and give a presentation. **Fee: There is a materials fee required for this course and an additional course fee applied via SFS bill. See course notes for course fee information. ** (Prerequisites: CMTJ-301 or equivalent course.) Studio 12, Credits 6 (Spring)

CMTJ-399

Metals and Jewelry Design Part-Time Co-op

Cooperative Education will provide Metals and Jewelry Design students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in METAL-BFA or STAR-BFA with department permission.) CO OP, Credits 0 (Fall, Spring, Summer)

CMTJ-498

Metals and Jewelry Design Internship

Metals and Jewelry Design Internship is open to all Metals undergraduate students with a minimum of a 3.0 GPA. Metals students should first procure an internship opportunity within our industry. Students must submit a completed permission form identifying the firm and include a job description that outlines their duties and responsibilities. Metals and Jewelry Design Internship must be approved by the student's Program Director or Administrative Chair. Students are required to submit a minimum 10-page paper about their experience and obtain a letter of review from their job site supervisor. 90 hours of work earns 1 semester credit. (Prerequisites: This class is restricted to students in METAL-BFA or STAR-BFA who have at least a 3.0 GPA and instructor permission to enroll.) Internship, Credits 1 - 6 (Fall, Spring)

CMTJ-499

Metals and Jewelry Design Co-op

Cooperative Education will provide Metals and Jewelry Design students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in METAL-BFA or STAR-BFA with department permission.) CO OP, Credits 0 (Fall, Spring, Summer)

CMTJ-501

Metals and Jewelry Design Senior I

This is the first of a two-semester sequential class covering advanced techniques and aesthetics of metal and jewelry design. The creative work developed during the semester will inform the student in the development of their senior capstone proposal. Through research and under the guidance of faculty, students will choose a theme for their proposed thesis work. The design and compilation of a professional resume is also completed. This course introduces advanced gem setting, identification and gemstone anatomy. Students will obtain instruction on the proper use and maintenance of the metals shop. Students will be taught advanced machine skills, hand skills and tools. Students will be required to conduct research on a historical metals topic, write a paper and give a presentation. **Fee: There is a materials fee required for this course and an additional course fee applied via SFS bill. See course notes for course fee information. ** (Prerequisites: CMTJ-302 or equivalent course.) Studio 12, Credits 6 (Fall)

College of Art and Design

CMTJ-502

Metals and Jewelry Design Senior II

This course, the second of a two-semester sequence, will aid the student in finalizing the development of their capstone, a self-directed project created in response to the students' research and technical needs. The student is guided by their written and verbal proposal to develop a cohesive body of work and required to present it in a capstone exhibition within the term. This course provides the student with individual research in technique and design. A chosen thematic focus relevant to issues of contemporary art and jewelry design will influence individual student development and the course's conversation through various assignments and group activities. The senior level students are required to assemble a group show of their four-year work, complete a job search and a professional portfolio including resume, photography, and renderings. **Fee: There is a materials fee required for this course and an additional course fee applied via SFS bill. See course notes for course fee information. ** (Prerequisites: CMTJ-501 or equivalent course.) **Studio 12, Credits 3 (Spring)**

CMTJ-530

Form and Fabrication: Metals and Jewelry Design

This is an elective course providing an opportunity for introductory study in metals: either hollowware or jewelry. Development of metals techniques, design fundamentals and encouragement of personal expression will be encouraged. The student will learn to evaluate new techniques, materials and concepts. Slide lectures, technical demonstrations, field trips, hands-on experience and critiques will be used. **Fee: There is a lab fee required for this course** (This course is available to RIT degree-seeking undergraduate students.) **Studio 6, Credits 3 (Fall, Spring, Summer)**

CMTJ-599

Metals and Jewelry Design Independent Study

Metals and Jewelry Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser will propose a course of study to pursue over the course of the semester. Goals and objectives will be outlined by the student in conjunction with their faculty adviser. To enroll in a Metals and Jewelry Independent Study students must obtain permission of an instructor and complete the Independent Study Permission Form to enroll. (Prerequisites: This class is restricted to students in CCER-BFA, GLASS-BFA, METAL-BFA, STAR-BFA or WOOD-BFA with instructor permission.) **Ind Study, Credits 1 - 6 (Fall, Spring)**

Sculpture

SCUL-201

Introduction to Sculpture

This course will examine professional sculptural practices, processes, and materials. Course content will cover additive, subtractive, assemblage, and substitution processes of making sculpture along with historical and contemporary approaches to the field. Students will develop skills in relation to individual concepts and directions. At the completion of this course students will learn how to create and critique sculptures that effectively communicate ideas. ** Fee: There is a lab fee required for this course** (Prerequisites: FDTN-131 or equivalent course.) **Studio 6, Credits 3 (Fall or Spring)**

SCUL-269

Sculpture for Non-Majors

This course will offer an introduction to sculpture and will expose students to basic concepts, forms, methods, and materials of the art form. The principles of space, volume, surface texture, multiple viewpoints, and gravity will be explored in three-dimensional projects. Students will learn how to use different processes, materials, and tools to create finished sculptures. ** Fee: There is a lab fee required for this course** (This class is open to all undergraduate students except for those in the FNAS-BFA, ILLM-BFA, ILLS-BFA, GRDE-BFA, INDE-BFA, IDDE-BFA, NMDE-BFA, CCER-BFA, GLASS-BFA, METAL-BFA, STAR-BFA, and WOOD-BFA majors.) **Studio 6, Credits 3 (Fall or Spring)**

SCUL-501

Sculpture

This course allows students to explore concepts, materials, processes, and techniques to develop a personal, cohesive three-dimensional body of work. Theories and history of sculpture will be discussed as relevant to individual directions. Course may be repeated. **Fee: There is a lab fee required for this course** (Prerequisites: SCUL-201 or equivalent course.) **Studio 6, Credits 3 (Fall, Spring)**

SCUL-511

Expanded Forms

The course will focus on the diverse new forms of expression that have emerged in contemporary fine art, including installation, performance, video, and digital art among the many other possibilities. Students will research some of these new forms and produce artwork in at least one of these forms. Course may be repeated for credit. **Fee: There is a lab fee required for this course** (Prerequisites: SCUL-201 or STAR-202 or GRDE-207 or NMDE-204 or SOFA-205 or equivalent course.) **Studio 6, Credits 3 (Fall, Spring)**

SCUL-543

Foundry Practices

This course is designed to introduce or develop students' skills in casting metals with an emphasis on cast iron and the use of a cupola. Advanced pattern-making, mold-making, spruing, patination, and casting techniques will be introduced. Students will develop their concepts through cast metal sculpture. **A lab fee is required for this course** (Prerequisites: FDTN-131 or SCUL-269 or equivalent course.) **Studio 6, Credits 3 (Fall or Spring)**

SCUL-573

Figure Sculpture

This course will focus on the creation of three-dimensional figurative work. Course content will cover sculpting directly from live models and creating multiple armatures. Students will use this knowledge to create several oil clay maquettes. At the completion of this course students will produce a finished figurative sculpture translating a chosen maquette into a permanent material. *A lab fee is required for this course* (Prerequisites: FDTN-131 or equivalent course.) **Studio 6, Credits 3 (Fall or Spring)**

SCUL-583

Welding and Fabrication

This course will introduce develop skills in metal fabrication. Course content will cover several different types of equipment utilized in the welding and cutting processes. Students will learn to learn to effectively use equipment to fabricate mild steel. At the completion of this course students will complete a body of work consisting of finished fabricated steel sculptures. The course will be taught off-campus at Rochester Arc and Flame Center, 115 Fedex Way, Rochester, NY. **Fee: There is a materials fee required for this course and an additional course fee applied via SFS bill. See course notes for course fee information** (Prerequisites: FDTN-131 or equivalent course.) **Studio 6, Credits 3 (Fall or Spring)**

Textiles

CWTD-530

Quilting Elective

This course will introduce the beginner to the textile studio and to textiles as a creative material. Particularly the art of quilting. The students will acquire the ability to sew by hand and by machine. Lectures will include topics such as quilt design, fabric surface design, the history of quilting and techniques of quilting. **Fee: A course fee applied via student account. ** (This course is available to RIT degree-seeking undergraduate students.) **Studio 6, Credits 3 (Fall, Spring)**

School of Art

Foundation Courses

FDTN-111

Drawing I

This course is an introduction to the visualization of form, thought and expression through the drawing process. Concepts are introduced by lectures, discussions, demonstrations, research, and assigned projects. Designed to provide a broad introductory experience, students will experiment with a wide variety of media, tools, techniques and subjects to develop drawing expertise and problem solving skills related to design and composition. Course work will be assessed through critique, facilitating self-assessment, and the growth of both a visual and verbal vocabulary. The focus of the course is to provide awareness of the full range of ways in which drawing is used as a tool for both self-expression and communication. (Undergraduate Art and Design) **Studio 6, Credits 3 (Fall, Spring)**

FDTN-112

Drawing II

This course is an introduction to the visualization of form, thought and expression through the drawing process. Concepts are introduced by lectures, discussions, demonstrations, research, and assigned projects. Designed to provide a broad introductory experience, students will experiment with a wide variety of media, tools, techniques and subjects to develop drawing expertise and problem solving skills related to design and composition. Course work will be assessed through critique, facilitating self-assessment, and the growth of both a visual and verbal vocabulary. The focus of the course is to provide awareness of the full range of ways in which drawing is used as a tool for both self-expression and communication. (Prerequisites: FDTN-111 or ITDI-211 or equivalent course.) **Studio 6, Credits 3 (Fall, Spring, Summer)**

FDTN-121**2D Design I**

This course is a structured, cumulative introduction to the basic elements and principles of two-dimensional design. Organized to create a broad introductory experience, the course focuses on the development of both a visual and a verbal vocabulary as a means of exploring, developing and understanding two-dimensional compositions. Concepts are introduced through lectures, discussions, demonstrations, research, assigned projects and critiques. The course addresses a wide variety of media, tools, techniques both traditional and technological, and theoretical concepts to facilitate skill development and experimentation with process. Visual comprehension, the ability to organize perceptions and horizontal thinking that crosses other disciplines and theories, are key foundational components to the development of problem solving skills. Accumulative aspects of the curriculum included the exploration of historical and cultural themes and concepts intertwined with aspects of personal interpretation and experience. (Undergraduate Art and Design) **Studio 6, Credits 3 (Fall, Spring)**

FDTN-122**2D Design II**

This course is the second semester of a sequential, structured introduction to the basic elements and principles of two-dimensional design. Organized to create a broad introductory experience, students will build upon the visual and a verbal vocabulary, media, techniques, skill development and processes acquired during the fall semester. This term will also focus on the comprehensive exploration of color theory as well as dealing with conceptualization and more advanced issues related to problem solving. Accumulative aspects of the curriculum included the exploration of historical and cultural themes and concepts intertwined with aspects of personal interpretation and experience. (Prerequisites: FDTN-121 or equivalent course.) **Studio 6, Credits 3 (Fall, Spring, Summer)**

FDTN-131**3D Design I**

This course presents a progressive study over two-semester in terminology, visual principles, exploration, concept generation, process, and techniques of three-dimensional design. Using hands-on problem solving, student will develop an informed understanding of the 3D form and space with an emphasis on the elements and principles of visual design and their function as the building blocks and guidelines for ordering a 3D composition. A heightened awareness of form and space will be developed through lecture, assigned projects, and critiques. Students will also develop a personal awareness of problem seeking and solving, experimentation, and critical analysis. **Note: May be taken as a one-semester offering** (Undergraduate Art and Design) **Studio 6, Credits 3 (Fall, Spring)**

FDTN-132**3D Design II**

This is the second-semester of a sequential course. The focus is on composing three-dimensional form and its relationship to space. Students will build on their prior term experiences, which include the introduction to 3D principles, materials, and building processes. Students will develop the sophisticated skill of conceptualization. More advanced problems will be assigned and students will have the opportunity to explore a wide range of material and process possibilities for their resolution. A heightened awareness of idea development and design research will be explored. Inclusion of 21st century themes in the arts of social cultural and community. (Prerequisites: FDTN-131 or equivalent course.) **Studio 6, Credits 3 (Spring, Summer)**

FDTN-141**4D Design**

4D Design introduces students to the basic concepts of art and design in time and space. The course explores elements of moving images such as continuity, still and moving image editing, transitions and syntax, sound and image relations, and principles of movement. Computers, video, photo, sound and lighting equipment are used to create short-form time-based work relevant to students in all majors and programs required to take this course. The course addresses the both historical conventions of time in art and recent technological advances, which are redefining the fields of Fine Art and Design. In focusing on the relations between students' spacing and timing skills, 4D Design extends and supplements the other Foundation courses, and prepares students for further work with time-based media. (Undergraduate Art and Design) **Lab 5, Credits 3 (Fall, Spring)**

FDTN-150**Technology Workshop: Topics**

This technology-based workshop course will support the growth and exploration of technology for undergrads in the College of Art and Design. Each workshop will run for 5-weeks and will have an assigned topic based in a software or technical practices as the workshop topic. Students can enroll in these courses without limitations as long as the course topic is different. **Lecture 1, Credits 1 (Fa/sp/su)**

FDTN-212**Drawing II Workshop: Topics**

This course is an investigation of the visualization of form, thought and expression through the drawing process. This workshop provides students with the opportunity to learn more about a particular experience in drawing while still covering required foundation elements. Different topics may be taken in the same semester. Topics may only be taken once. Concepts are introduced by lectures, discussions, demonstrations, research and assigned projects. The focus of the course is to provide awareness of the full range of ways in which drawing is used as a tool for both self-expression and communication. (Prerequisites: FDTN-111 or ITDI-211 or equivalent course.) **Studio 6, Credits 3 (Spring)**

FDTN-222**2D Design II Workshop: Topic**

This workshop provides students with the opportunity to learn more about 2D compositions within a more open and experimental approach while still covering the core foundational 2D design II concepts. Different topics may be taken in the same semester, but unique topics may only be taken once. Material and conceptual focus will be determined by the faculty proposing each unique topic. (Prerequisites: FDTN-121 or equivalent course.) **Studio 6, Credits 3 (Spring)**

FDTN-232**3D Design II Workshop: Topic**

This workshop provides students with the opportunity to learn more about 3D compositions within a more open and experimental realm while still covering the core Foundation concepts. Different topics may be taken in the same semester. Topics may only be taken once. The focus is on composing three-dimensional form and its relationship to space. Material exposure will be determined by the topic's instructor. (Prerequisites: FDTN-131 or equivalent course.) **Studio 6, Credits 3 (Spring)**

Art History
ARTH-124**Survey: Themes in the History of Art:**

This course introduces students to central issues in the history of art through the focused investigation of a specific theme. Themes will be global in scope, and potential examples include monuments and preservation; the concept of modernity in the visual arts; art and identity; diachronic studies of select works of art; or histories of a particular medium, subject, or form of patronage. Students will apply foundational methods of art history, including basic research tools, formal analysis, and contextual analysis; will engage in careful, conscious looking; will learn to describe and analyze what they see; and will articulate how works of art can express meaning. This course may be repeated with different topics. Topic is determined by the instructor. **Lecture 3, Credits 3 (Fa/sp/su)**

ARTH-135**Survey: Ancient to Medieval Art**

In this course students will examine the forms, styles, functions, and meanings of important objects and monuments dating from prehistory through the Middle Ages, and consider these works of art in their social, historical and cultural contexts. The primary goals of this course are to learn how to look, how to describe and analyze what we see, and how to use these skills to understand and explain how art visually expresses meaning. At the end of the term, students will have gained a foundational knowledge of the object, scope and methods of the discipline of art history. The knowledge obtained in this introductory course will also guide students in their own creative endeavors. **Lecture 3, Credits 3 (Fa/sp/su)**

ARTH-136**Survey: Renaissance to Modern Art**

In this course students will examine the forms, styles, functions, and meanings of important objects and monuments dating from the Renaissance through the beginning of the twentieth century, and consider these works of art in their social, historical and cultural contexts. The primary goals of this course are to learn how to look and how to describe and analyze what we see, and to use these skills to understand and explain how art visually expresses meaning. At the end of the term, students will have gained a foundational knowledge of the object, scope and methods of the discipline of art history. The knowledge obtained in this introductory course will also guide students in their own creative endeavors. **Lecture 3, Credits 3 (Fa/sp/su)**

ARTH-137**Survey: Arts of the Ancient Americas**

In this course students will examine the forms, styles, functions, and meanings of ancient American architecture, sculpture, painting, and ceramics from prehistory up to the sixteenth century, when the Spanish conquistadores defeated the Aztec and Inca empires and imposed colonial rule. Students also will consider these works in their social, historical, and cultural contexts. At the end of the term, having gained a foundational knowledge of the object, scope, and methods of the discipline of art history, students will be able to describe and analyze what they see, and to apply art-historical methods to explain how indigenous arts of the Americas visually express meaning. **Lecture 3, Credits 3 (Fa/sp/su)**

ARTH-311**Art and Architecture of Italy: 1250-1400**

The subject of this course is painting, sculpture and architecture of the second half of the Dugento and the Trecento in Italy and its aim is to provide insight into the ways in which society and culture expressed its values through art; 1250 marks the death of the last Hohenstaufen Holy Roman Emperor Frederick II and 1401 is considered by many to mark the beginning of the Early Renaissance, with the competition for the second set of bronze doors for the Baptistery of Florence. Artists students will study will include Nicola and Giovanni Pisano, Arnolfo di Cambio, Cimabue, Pietro Cavallini, Giotto, Duccio, Simone Martini, Pietro and Ambrogio Lorenzetti, Tino da Camaino, Andrea Pisano, Orcagna, Andrea Bonaiuti, Giusto de' Menabuoi, Altichiero, and Paolo Veneziano. The works students will study will include altarpieces, private devotional images, mural cycles, tombs, churches, chapels, town halls, palazzi and piazze. Questions for consideration will include: the nature and meaning of this proto-Renaissance, the importance of antique and medieval precedents, the increasing attention to the effects of nature, the role of the patron, and the relevance of documents, literary sources and visual precedents for our interpretation of images. **Lecture 3, Credits 3 (Fall)**

ARTH-312 **Art and Architecture of Italy: 1600-1750**
 This course will focus on Italian artists working in Italy from circa 1600 to circa 1750 and to provide insight into the ways in which society and culture expressed its values through art. Students will explore painting, sculpture, and architecture, and more or less chronologically in each major artistic center of Italy. Students will also have the opportunity to explore how these different media coalesce to create an overwhelming visual experience. Students will pay particular attention to major commissions given to Annibale Carracci, Michelangelo da Caravaggio, Gianlorenzo Bernini, Alessandro Algardi, Francesco Borromini, Pietro da Cortona, Guarino Guarini, Filippo Juvarra and Giambattista Tiepolo, as we seek to define the nature and meaning of the Italian Baroque and Rococo. **Lecture 3, Credits 3 (Spring)**

ARTH-317 **Art and Architecture in Florence and Rome: 15th Century**
 The subject of this course is 15th century painting, sculpture and architecture in Florence and Rome and its aim is to provide insight into the ways in which society and culture expressed its values through art between 1401, the year when the Calimala Guild announced a competition for a second set of bronze doors for the Baptistery of Florence, and 1500 the year when Michelangelo completed work on the Roman Pietà. Artists students will study include Filippo Brunelleschi, Lorenzo Ghiberti, Donatello, Nanni di Banco, Luca della Robbia, Michelozzo, Leon Battista Alberti, Lorenzo Monaco, Gentile da Fabriano, Masaccio, Fra Angelico, Fra Filippo Lippi, Paolo Uccello, Bernardo and Antonio Rossellino, Andrea del Verrocchio, Antonio del Pollaiuolo, Sandro Botticelli, Domenico del Ghirlandaio, Leonardo da Vinci, Filippino Lippi and Michelangelo. The works students will study will include altarpieces, private devotional images, portraits, mural cycles, paintings and sculpture of mythological subjects, allegories, ceilings, doors, tombs, churches, chapels, palazzi, villas and piazze. Questions for consideration will include: the nature and meaning of the Early Renaissance, developments in artistic theory and practice, the importance of Antique and Medieval precedents, the increasing attention to the effects of nature, the role of the patron, and the relevance of documents, literary sources and visual precedents for our interpretation of images. **Lecture 3, Credits 3 (Spring)**

ARTH-318 **Art and Architecture in Florence and Rome: 16th Century**
 The subject of this course is 16th century painting, sculpture and architecture in Florence and Rome and its aim is to provide insight into the ways in which society and culture expressed its values through art between 1501, the year when Michelangelo returned from Rome to Florence to begin carving the colossal marble David, and 1600 which marks the emergence of the Baroque style in Rome. Artists students will study include Leonardo da Vinci, Bramante, Michelangelo, Raphael, Sebastiano del Piombo, Jacopo Sansovino, Baccio Bandinelli, Jacopo Pontormo, Agnolo Bronzino, Benvenuto Cellini, Bartolomeo Ammannati, Giorgio Vasari, and Giovanni Bologna. The works students will study will include altarpieces, private devotional images, portraits, mural cycles, paintings and sculpture of mythological subjects, allegories, ceilings, tombs, churches, chapels, palazzi, villas, piazze, fountains and equestrian monuments. Questions for consideration will include: the nature and meaning of the High Renaissance, Mannerism, and the late Renaissance, developments in artistic theory and practice, the importance of antique and medieval precedents, the increasing attention to the effects of nature, the role of the patron, and the relevance of documents, literary sources and visual precedents for our interpretation of images. **Lecture 3, Credits 3 (Fall)**

ARTH-364 **Art in Paris**
 Students will study the history of artistic production and display in Paris, a city long regarded as a capital of the art world, from the Middle Ages to the twentieth century. The class will explore issues related to artistic production and display in Paris, including Paris as a center for Gothic production, art and the royal court, the intersection of classicism and French art, art and revolution, art and public space, Paris as a center of modernity, the role of historic conservation, and the role of museums. **Lecture 3, Credits 3 (Fall, Spring)**

ARTH-366 **18th, 19th Century Art**
 This course will examine Western art in the period leading up to the French Revolution and the early "Modern" period – generally, the mid-19th century. This process will include a close examination of the works and careers of individual artists who have been considered some of the best-known representatives of the most significant art movements of the era, such as Rococo, Neoclassicism, Romanticism, Realism, and Impressionism. Students will learn a new vocabulary for discussing visual representations and will situate issues within political, religious, literary, and historical contexts. Throughout the course, a series of questions about art will be presented and students will assess how the nature of those questions affects the way they see images. **Lecture 3, Credits 3 (Fall)**

ARTH-368 **20th Century Art: 1900-1950**
 A critical study of the art and visual culture of the first five decades of the twentieth century. Major stylistic movements in Europe and America will be examined with special attention to innovations in materials, subject matter, and philosophy. Central themes include: the relationship between art and politics, abstraction vs. figuration, primitivism, anti-modernism, and the search for origins, reactions to modernity and the rise of technology, the tension between the avant-garde and popular culture, utopian and dystopian views of art and society, the institutional critique, artistic responses to Phenomenology, Existentialism, Nihilism, and the special role of art and artists in modern society. (Prerequisites: ARTH-136 or equivalent course.) **Lecture 3, Credits 3 (Fall or Spring)**

ARTH-369 **20th Century Art Since 1950**
 A critical study of the art and visual culture of the second half of the twentieth century. Major stylistic movements in Europe and America are examined with special attention to innovations in materials, subject matter, and philosophy. Central themes include: Abstract Expressionism, Pop Art, West Coast Junk, Funk and Beat, Nouveau Réalisme, CoBRA and Situationism, Arte Povera, Earthworks, Site Specificity, Allegory, Conceptualism, Minimalism, Feminism, Performance, Happenings, Installation, and New Media. (Prerequisites: ARTH-136 or equivalent course.) **Lecture 3, Credits 3 (Fall or Spring)**

ARTH-373 **Art of the Last Decade**
 A critical study of the art and visual culture of the last decade with a strong emphasis on the current American and international scene. The primary focus will be on living artists and artists who remain crucial to contemporary debates with special attention paid to recent, current, and forthcoming exhibitions, their methodological frameworks, and historical context, as well as the key critics, theorists and curators who are shaping the visual culture of the present. (Prerequisites: Completion of one course in Art History (ARTH) at the 100 level is required.) **Lecture 3, Credits 3 (Fall or Spring)**

ARTH-378 **Baroque Painting in Flanders**
 Students will study the history of Baroque painting in Flanders from the mid-1500s to 1700 with a specific focus on women, gender and illness, and the birth of Early Modern Europe. Students will consider the meaning of the Flemish Baroque, the observation and recording of natural appearances (still-life paintings), "hidden symbolism" and sacramental themes and connections between Flemish and Italian art. Peter Paul Rubens and Anthony Van Dyck are among the major artists to be studied in addition to those who are lesser known. **Lecture 3, Credits 3 (Spring)**

ARTH-379 **Renaissance Painting in Flanders**
 The course explores the history of Renaissance painting in the Southern Netherlands from the beginning of the 15th century to the end of the 16th century with specific focus on women, gender, and illness and the birth of Early Modern Europe. We will consider the meaning of the Renaissance in Flanders, the observation and recording of natural appearances, "hidden symbolism" and sacramental themes in Early Netherlandish painting, the connections between Flemish, German, and Italian art, the development of new genres in the 16th century, and "originality" and artistic progress. **Lecture 3, Credits 3 (Spring)**

ARTH-392 **Theory and Criticism of 20th Century Art**
 A critical study of some of the major theoretical and philosophical texts that ground twentieth century art as well as their impact on artists and art historians/critics. Taken together they constitute what is presently called critical theory across a wide range of the humanities and social sciences, as well as the emergence of an alleged postmodernism. Major issues include: the theory of autonomy and self-reflexivity, the structuralist paradigm, post-structuralist and Marxist critiques of modernism, feminist approaches to spectacle, semiotics, and the theory of the sign, spectatorship, and commodity fetishism, the relation of vision to constructions of identity and power. Key authors to be discussed include: Lessing, Kant, Greenberg, Foucault, Barthes, Benjamin, Saussure, Pierce, Levi-Strauss, Lacan, Lyotard, Bataille, Debord, Baudrillard, and Ranci. (Prerequisites: Completion of one course in Art History (ARTH) at the 100 level is required.) **Lecture 3, Credits 3 (Fall or Spring)**

ARTH-400 **Seminar: Research in Art History**
 In this seminar, students will explore a specific topic of research within the field of art history. The topic will be determined by the instructor's research focus or expertise, with the goal of directly engaging advanced undergraduate students with current research methodologies. Through readings, intensive discussion, and individual or group projects, students will identify and assess disciplinary research methods, and will apply those methods in the investigation of an issue designated by the instructor, assisting in the production or refinement of art-historical knowledge. The topic will be advertised by the instructor in advance of the term offered. Note: at least one prior 300-level or above art history course is strongly recommended. (Prerequisite: ARTH-124 or ARTH-135 or ARTH-136 or equivalent courses.) **Seminar 3, Credits 3 (Fa/sp/su)**

ARTH-457 **Art and Activism**
 This course will focus on modern and contemporary artists and artists' collectives who use their work for the explicit purpose of changing society, and who subscribe to the belief that all representation is ideological. Students will examine texts that propose a form of activism and persuade artists to be responsible for the way they represent the world—and perhaps even determine if the goal of art is not to represent the world in the first place. "What is art?" "What should art do?" "How can art incite social change?" "Does the artist have any social responsibility?" are just some of the questions raised when art comes into contact with the political sphere—especially when that art proposes to make a political or social change, i.e., when art becomes action. The artists and theorists that we will discuss are concerned with problems in our society that effect gender, race, sexuality, poverty, labor issues, and the environment. Key artists to be discussed include Martha Rosler, Kara Walker, David Hammons, Allan Sekula, Mel Chin, Barbara Kruger, Hans Haacke, Fred Wilson, General Idea, Guerilla Girls, Adrian Piper, and Alfredo Jaar. (Prerequisites: Completion of one course in Art History (ARTH) at the 100 level is required.) **Lecture 3, Credits 3 (Fall or Spring)**

ARTH-500**Postmodernism and After: Contemporary Aesthetics**

This course explores the history of contemporary art and visual culture from postmodernism to the present. We will focus on major artistic movements such as Pop Art, Minimalism, Conceptualism, Performance Art, and Relational Aesthetics. Along with and inseparable from aesthetics and media, we will chart the ways in which class, gender, race, and sexual inequality have figured into the major aesthetic movements of our time. By reading theory and criticism, discussing artworks across media forms, and researching artistic movements in context, students will examine art since the 1960s and its connections to cultural history. **Lecture 3, Credits 3 (Spring)**

ARTH-521**The Image**

The image remains a ubiquitous, controversial, ambiguous and deeply problematic issue in contemporary critical discourse. This course will examine recent scholarship devoted to the image—a ubiquitous controversial, ambiguous and deeply problematic issue in contemporary critical discourse—and the ideological implications of the image in contemporary culture. Topics will include: the modern debate over word vs. image, the mythic origins of images, subversive, traumatic, monstrous, banned and destroyed images (idolatry and iconoclasm), the votive, the totem, and effigy, the mental image, the limits of visibility, the moving and projected image, the virtual image, dialectical images, image fetishism, the valence of the image, semiotics and the image, as well as criteria by which to assess their success or failure (their intelligibility) and their alleged redemptive and poetic power. Students will explore the theoretical framework of the concept of the image, and critically evaluate these theories within their broader intellectual and historical contexts. (Prerequisites: Completion of one course in Art History (ARTH) at the 100 level is required.) **Lecture 3, Credits 3 (Fall or Spring)**

ARTH-522**Documentary Aesthetics**

This lecture course explores documentary aesthetics across 20th and 21st-century art and visual culture. Students will investigate documentary forms and methods, and how they have informed contemporary art practices. Analysis begins with early works in film and photography, and moves on to contemporary art that involves documentary work, ranging from photography and video to installations and conceptual art. **Lecture 3, Credits 3 (Spring)**

ARTH-541**Art and Architecture of Ancient Rome**

Students will examine the visual culture of ancient Roman civilization from the foundations of Roman culture through the Late Imperial era. Rome was heavily reliant on images as a means of transmitting concepts of lineage, status, and power; students will learn how these images may have been perceived in the context of Roman social and political history, and how style may have been used as an ideological tool. **Lecture 3, Credits 3 (Fall, Spring)**

ARTH-544**Illuminated Manuscripts**

Students in this course will examine the history of illuminated manuscripts, learning about the working methods of artists as well as the cultural significance of the illuminated book. Issues of production, style, function, and patronage will be introduced, and students will explore the relationships between images, texts, and readers. **Lecture 3, Credits 3 (Fall, Spring)**

ARTH-549**Topics in Global Art and Architecture:**

This course will focus on a critical examination of a select theme within art and architecture beyond the traditions of Europe or modern North America. A topic description will be posted each term the course is offered. This course can be taken multiple times for credit, but Individual topics must be different. **Lecture 3, Credits 3 (Fa/sp/su)**

ARTH-550**Topics in Art History**

A focused, critical examination and analysis of a selected topic in Art History varying according to faculty teaching the course. A subtopic course description will be published each term the course is offered. Students may take this course multiple times with different topics. Topic will be determined by the instructor. **Lecture 3, Credits 3 (Fall, Spring)**

ARTH-551**Topics in Art History, Writing Intensive:**

A focused, critical examination and analysis of a selected topic within art history, varying according to faculty teaching the course. Students will practice writing skills within the discipline of art history. A subtopic description will be published each term the course is offered. Students may take the course multiple times with different topics. Topics will be determined by the instructor. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 3, Credits 3 (Fall, Spring)**

ARTH-555**Topics in Medieval Art and Architecture**

A critical examination of a select theme within the field of medieval art and architecture. A subtopic description will be posted each term the course is offered. This course may be repeated for credit, but students may not repeat a topic. **Lecture 3, Credits 3 (Fall, Spring)**

ARTH-556**Art Comics**

This course will explore how the comics medium has figured into the history of modern and contemporary art and visual culture. Students will explore how cartooning, drawing, and printmaking in the 19th century led to the development of early comics and the newspaper comic strip, how early 20th-century comics fit into the modernist avant-garde, how postwar artists began to use the comics medium as both source material and as a medium unto itself, how comics have been incorporated into contemporary art museums and galleries, and how contemporary comics artists engage with abstraction, medium specificity, seriality, and the archive. The course will draw from an interdisciplinary range of methodologies, from art history and visual culture to literary studies and museum studies. **Lecture 3, Credits 3 (Fall)**

ARTH-558**The Gothic Revival**

This class covers the Gothic Revival of the 18th, 19th, and 20th centuries. Issues to be examined include the question of stylistic revival vs. stylistic survival; the origin and meanings of Gothic as a stylistic category; the impact of antiquarianism on the Gothic Revival in the 18th century; Gothic and 18th century modes of vision; Gothic in the private and public spheres; Gothic's associations with science, gender, nationalism, and morality; the Gothic Revival and the Pre Raphaelites, and major figures within the movement such as A.W.N. Pugin and John Ruskin. **Lecture 3, Credits 3 (Fall, Spring)**

ARTH-561**Latin American Art**

Students will explore the historical development of art of Latin America from colonial times to the present. Included will be a consideration of painting, sculpture, architecture, graphic, and photographic arts. Potential themes to be addressed include the dependence on the European neo-classical academic model; indigenism; nationalism and the resurgence of popular art; the role of the visual arts in the construction of history; the conflicts and tensions involved in the search for a cultural identity. **Lecture 3, Credits 3 (Spring)**

ARTH-563**Modern Architecture**

Students will explore the history of world architecture from the late nineteenth century to the present. Issues to be considered include the definition of modern as it applies to the built environment; new building types; historicism; stylistic movements; urban development; housing; modern materials; critical theory and its impact on design; and architectural representation. **Lecture 3, Credits 3 (Spring)**

ARTH-568**Art and Technology: from the Machine Aesthetic to the Cyborg Age**

Students will explore the link between art and technology in the 20th century with special focus on the historical, theoretical, and ideological implications. Topics include the body in the industrial revolution, utopian, dystopian, and fascist appropriations of the machine, engendering the mechanical body and machine-eroticism, humanism, the principles of scientific management, the paramoic and bachelor machine, multiples, mass production, and the art factory, industrial design and machines for living, the technological sublime, cyborgs, cyberpunk and the post-human. Key theorists to be discussed include: Karl Marx, Norbert Weiner, Reyner Banham, Siegfried Gideon, Marshall McLuhan, Michel Foucault, Deleuze and Guattari, Donna Haraway, and Martin Heidegger, as well as examples from film (Modern Times, Metropolis, Man with the Movie Camera and Blade Runner) and literature (Shelley's Frankenstein, and Zamyatin's We). Artists covered include: Tatlin, Rodchenko, Malevich, Moholy-Nagy, Léger, Sheeler, Picabia, Duchamp, Calder, Ernst, Le Corbusier, Klee, Tinguely, Oldenburg, Rauschenberg, Warhol, Beuys, Kiefer, Lewitt, Fischli and Weiss, Acconci, Nam June Paik, Survival Research Laboratories, Bureau of Inverse Technology, Stelarc, Orlan, Dara Birnbaum, Roxy Paine, Marina Abramovic, Kac and Bill Viola. (Prerequisites: Completion of one course in Art History (ARTH) at the 100 level is required.) **Lecture 3, Credits 3 (Fall or Spring)**

ARTH-571**Extreme Abstraction**

This course examines the historical foundation, critical debate, and ideological motivations regarding abstraction in the modern era. It also explores some of the key theorists of abstraction (Wassily Kandinsky, Paul Klee, Clement Greenberg, Stan Brakhage, and B.H.D. Buchloh), as well as the critical grounds for the shift toward the nonfigurative. Relevant historical movements that will be studied include Abstract Expressionism, Suprematism, De Stijl, Cubism, the Monochrome, Photographic and Filmic Abstraction, and the limits of representation. Key artists to be considered include: Man Ray, Charles Biederman, Gerhard Richter, Chuck Close, Ellsworth Kelly, Robert Ryman, Agnes Martin, Robert Mangold, Bridget Riley, Tony Conrad, Stan Brakhage and Harry Smith. (Prerequisites: Completion of one course in Art History (ARTH) at the 100 level is required.) **Lecture 3, Credits 3 (Fall or Spring)**

ARTH-572**Art of the Americas**

This is a survey course of native north and South American visual arts within an historical and anthropological framework. Included will be an examination of the development of principal styles of Ancient American architecture, sculpture, painting, and ceramics up to the 16th century when the Spanish conquistadors defeated the Aztec and Inca empires and imposed colonial rule. Consideration is also given to materials used, techniques of construction, individual and tribal styles, as well as to the meaning and function of various art forms within Native American societies. **Lecture 3, Credits 3 (Fall)**

ARTH-573

Conceptual Art

This course examines the widely influential mid-1960s art movement that questioned the fundamental nature of art itself by renouncing the material art object as well as the phenomenon of art making. The definition of art as well as its institutional framework was thereby expanded, and the idea, concept, or intellectual dimension of the work was underscored. Students will be acquainted with the philosophical foundations and critical implications of this global movement across a wide spectrum of works and practices (paintings, performance, installations, books and texts, photography, film, and video) and its relevance to contemporary concerns. (Prerequisites: Completion of one course in Art History (ARTH) at the 100 level is required.) **Lecture 3, Credits 3 (Fall or Spring)**

ARTH-574

Dada and Surrealism

Students will examine the widely influential Dada and Surrealist movements in Europe and the United States from 1916 through the post-World War II period as well as their relevance to contemporary concerns. Emphasis is on identifying the major works of artists involved in these movements as well as their philosophical foundations, critical implications, as well as the broader literary and ideological contexts (e.g., Freud, Breton, Lautréamont, Leiris and Bataille). A wide range of works and practices (paintings, performance, installations, literary texts, photography, film, and ephemeral objects) will be studied, and the work of certain key artists (Höch, Heartfield, Schwitters, Duchamp, Picabia, Dalí, Ernst, Giacometti, Man Ray, Bellmer, Cahun, Cornell, Magritte, Miro, Oppenheim, Toyen and Picasso) will be analyzed in depth. (Prerequisites: ARTH-136 or equivalent course.) **Lecture 3, Credits 3 (Fall or Spring)**

ARTH-576

Modernism and Its Other: Realism in the Shadow of Expressionism

The idea that the artist expresses his/her individuality and then communicates that "self" to the rest of "humanity" through a higher, transcendental language has dominated the discourse and practice of modernist art. In retrospect, the art that dominated most of the first half of the 20th century was of an expressive nature, while art that in any way addressed direct and specific social issues was banished by the art world's major institutions. Students will look at the circumstances of how Realism became subordinate to expressionism. The course will examine the roots of both movements, taking us at times into the 18th and 19th centuries, but we will concentrate on how institutions like the Museum of Modern Art helped to define how we see the history of 20th century art as being predetermined and following teleology. Students will explore how modernism's "other", namely Realism, survived and gained new currency in practices of late 20th and early 21st-century art. (Prerequisites: Completion of one course in Art History (ARTH) at the 100 level is required.) **Lecture 3, Credits 3 (Fall or Spring)**

ARTH-577

Displaying Gender

This course brings together two of the most significant strains of recent art historical scholarship: the study of gender in representation and the critical examination of exhibitions and museums with particular focus given to key examples of curatorial practice from the late 19th century to the present day. Through readings, possible museum visit(s), class discussions, and guided individual research, questions of gender in exhibitions will be considered in relation to other aspects of identity including sexuality, race, and class. **Lecture 3, Credits 3 (Spring)**

ARTH-578

Edvard Munch

The Norwegian artist Edvard Munch (1863-1944) continues to generate a great deal of popular interest, critical scholarship, and reflection. A painter, printmaker, photographer, and filmmaker, Munch was also a prolific writer, well acquainted with the symbolist poets and playwrights, as well as the broad intellectual drift of the fin-de-Siècle. He is the one Scandinavian artist included within the Modernist canon and his image, *The Scream* (1893), is an icon of the modern age. This course will examine recent scholarship devoted to Munch and the critical issues that his work addresses. It will also place him within the broader cultural context of Scandinavian and European modernism, while examining his impact on subsequent generations. (Prerequisites: ARTH-136 or equivalent course.) **Lecture 3, Credits 3 (Fall or Spring)**

ARTH-581

Realism and the Avant-Garde in Russian Art

The concept of the avant-garde is considered by some to be synonymous with Modernism; the radical move away from classical forms of representation in the late 19th and early 20th centuries is typical of how one understands the avant-garde. In Russia, the experiments in art from the mid 1890s through 1922 are seen as extreme departures from art practices of the earlier 19th century. Although this art is very often described, like other western art of the period, in terms of form rather than with regard to its ideological content, students will examine the avant-garde's social and, therefore, political underpinnings in addition to its formal qualities. In order to get to the roots of an earlier understanding of the avant-garde, we find in its beginnings the writings of Claude Henri de Rouvroy, comte de Saint-Simon, and Olinde Rodrigues. In Russia the artists who painted images that represented the social world, and therefore put themselves in opposition to the status quo, were known as the *Peredvizhniki*. Students will connect this group of artists to the Russian formal and political avant-garde of the early 20th century and to the latter non-conformist artists of the second half of the 20th century that coincides with Perestroika and the eventual demise of the Soviet Union. (Prerequisites: Completion of one course in Art History (ARTH) at the 100 level is required.) **Lecture 3, Credits 3 (Fall or Spring)**

ARTH-583

Installation Art

This course will introduce students to historic, contemporary, and critical issues surrounding installation art, with a particular focus on changes in the concepts and media of installation art over the last several decades. There will be an emphasis on the development of the concept of an installation project and its relationship to site and/or audience. Both public and gallery spaces will be discussed. (Prerequisites: Completion of one course in Art History (ARTH) at the 100 level is required.) **Lecture 3, Credits 3 (Fall or Spring)**

ARTH-584

Scandinavian Modernism

Students will examine the decorative arts and visual culture of modern Scandinavia from 1860 to the present, with special emphasis on the social, economic, and political impulses that have shaped them. Scandinavian Modern design plays a significant role in the postwar epoch; it is equated with such leading brands as Volvo, Saab, Ericsson, Nokia, H&M, Electrolux Orrefors, Georg Jensen, ARTEK, Iittala, and IKEA and the idea of progressive, social democracy. The myths and realities of its success will be examined and related to emerging cultural and national identities, as well as its impact on contemporary design. (Prerequisites: Completion of one course in Art History (ARTH) at the 100 level is required.) **Lecture 3, Credits 3 (Fall or Spring)**

ARTH-586

History of Things: Studies in Material Culture

This course is an examination of techniques and materials together with a historical overview of the artistic achievements of craftsmen and women in the past, with particular emphasis on ceramics and metalsmithing. It includes study of Renaissance and early modern earthenware and stoneware as a prelude to the consideration of the history of porcelain and explores creative thinking and designing in other traditional craft areas such as fiber, glass, and wood. **Lecture 3, Credits 3 (Fall)**

ARTH-588

Symbols and Symbol-Making: Psychoanalytic Perspectives on Art

Students will explore the links between psychoanalytic theory, art history, and visual culture with special focus on the work of Sigmund Freud, Carl Jung, and their followers. A central aim is to examine the way in which psychoanalytic theory has been employed by art historians and theorists as a mode of interpretation, as well as to study how, why, and what several of the most notable psychoanalysts have written about art. Topics include the interpretation of dreams, transference, the Oedipal myth, melancholia, narcissism, abjection, the structure of the unconscious, the fetish, Archetypes and the Collective Unconscious, as well as outsider art, and the art of the insane. Key theorists to be discussed include: Freud, Jung, D.W. Winnicott, Melanie Klein, Jacques Lacan, Otto Rank and Julia Kristeva; individual artists studied include: Albrecht Dürer, Leonardo da Vinci, Edvard Munch, Lars Hertervig, Max Ernst, Jackson Pollock, Antonin Artaud, Louise Bourgeois, Mary Kelly and Victor Burgin; in addition to examples from film (Maya Deren, Luis Buñuel and Salvador Dalí, and Stan Brakhage). (Prerequisites: Completion of one course in Art History (ARTH) at the 100 level is required.) **Lecture 3, Credits 3 (Fall or Spring)**

ARTH-599

Art History Independent Study

Art History Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser will propose a course of study. Art History Independent Study students must obtain permission of an instructor and complete the Independent Study Permission Form to enroll. (This course requires permission of the Instructor to enroll.) **Ind Study, Credits 1 - 6 (Fall, Spring, Summer)**

Illustration

ILLS-105

Making Comics

Students will learn about comics structure and key elements of comics storytelling to create comic sequences in multiple panels. Assignments will combine text with images in short form narrative layouts. Class structure will allow for exploration of a variety of genres, styles, and storytelling. Equal focus will be given to character development, environment, and story. (Prerequisites: FDTN-111 or FDTN-121 or FDTN-131 or ITDI-211 or ITDI-236 or SOFA-108 or equivalent course.) **Lecture 2, Credits 3 (Fall or Spring)**

ILLS-105

Making Comics

Students will learn about comics structure and key elements of comics storytelling to create comic sequences in multiple panels. Assignments will combine text with images in short form narrative layouts. Class structure will allow for exploration of a variety of genres, styles, and storytelling. Equal focus will be given to character development, environment, and story. (Prerequisites: FDTN-111 or FDTN-121 or FDTN-131 or ITDI-211 or ITDI-236 or SOFA-108 or equivalent course.) **Studio 3, Credits 3 (Fall or Spring)**

ILLS-206**2D Composition and Color**

This course will provide students with instruction and assignments to practice and apply compositional picture plane dynamics using representational subject matter. Students will explore the principles of composition through the use of formal visual elements such as line, shape, value and color to achieve effective two-dimensional compositions. (Prerequisite: FDTN-111 or DDDD-208 or ITDI-211 or SOFA-108 or equivalent course.) **Studio 6, Credits 3 (Spring)**

ILLS-209**3D Applications: the Figure**

Students will build upon their experience in 3D Design I including materials, and building processes, while constructing the human figure. Sculpted figures will portray accurate human anatomic structure, inference of function, and balance. (Prerequisites: FDTN-131 or equivalent course.) **Studio 6, Credits 3 (Spring)**

ILLS-213**Illustration I**

Illustration I is the primary core course for illustration majors in their sophomore year. The students approach major elements of technique, application, and theory in relation to becoming professional illustrators. Studio sessions involve basic problem solving, anatomy, pictorial composition, media applications, figurative expression, use of reference tools, and illustrative techniques. Class structure allows demonstrations of processes and experimentation for assignment development. Group and individual critiques will be used to evaluate work. (Prerequisites: FDTN-112 or equivalent course.) **Studio 5, Credits 3 (Fall or Spring)**

ILLS-214**Anatomical Illustration**

This course will provide an in-depth anatomical approach to drawing the figure. Students will practice drawing human anatomy including body and head postures, facial expressions, and hand gestures. Students will learn anatomical proportioning while drawing from observation from models to convey emotions such as anger, sadness, fear, disgust, etc. Students will also learn to use photographic support references when drawing the figure. By the conclusion of the semester students will be able to have intermediate to advanced level anatomical drawing skills. (Prerequisites: ILLS-209 or equivalent course.) **Studio 5, Credits 3 (Fall or Spring)**

ILLS-219**Digital Illustration I**

This course will provide students with methods of conceptualizing, organizing, and executing illustrations using digital media. Projects will expose students to various types of digital techniques using current software applications for the creation of professional level assignments. The course will emphasize conceptual problem-solving methodology and the language of visualization while providing a consistent foundation of picture making as it relates to professional illustration production. Color systems, creation tools, and digital terminology and workflow will also be emphasized within this course. (Prerequisites: FDTN-122 or FDTN-222 or SOFA-108 or ILLS-206 or equivalent course.) **Studio 5, Credits 3 (Fall or Spring)**

ILLS-250**Illustration Fundamentals Topic**

Investigation into the fundamentals of illustration. Subject offerings will vary by intended preparation for the illustration field. This course may be repeated, however topics can only be taken once. (Prerequisites: FDTN-111 and FDTN-121 and FDTN-131 or equivalent courses.) **Studio 6, Credits 3 (Fall, Spring)**

ILLS-313**Illustration II**

This course will focus on preparing students to create work for a variety of illustration markets including the advertising, editorial, corporate and book publishing markets. Emphasis will be placed on the development and creation of a variety of finished illustrations that will demonstrate understanding of current industry trends and standards. Students will gain insight into the differences and nuances of these illustration specializations. Creative problem solving, stylistic self-expression, and technical proficiency will be emphasized. Students will participate in individual and group reviews and critiques. (Prerequisites: ILLS-213 or equivalent course.) **Studio 5, Credits 3 (Fall, Spring)**

ILLS-318**Dimensional Illustration I**

This course will introduce students to an alternative style of illustration that will expand their thinking into the third dimension. Emphasis will be placed on planning and preparation of compositional elements in three-dimensional sculptural form and creative problem solving. Students will learn to techniques in professional documentation of their artwork. Students will be encouraged to explore a variety of materials and techniques to complete projects. (Prerequisites: FDTN-112 or FDTN-122 or ILLS-206 or equivalent course.) **Studio 5, Credits 3 (Fall or Spring)**

ILLS-319**Digital Illustration II**

Digital Illustration II will provide students with advanced methods of conceptualizing, organizing and executing illustrations using the computer. Projects will expose students to various types of digital techniques using vector and raster-based software applications, and a variety of input and output devices for the creation of professional level assignments. The course will emphasize conceptual problem-solving methodology and the language of visualization while providing a consistent foundation for digital illustration as it relates to professional illustration production. Color systems, digital terminology and pre-press file formats will be also be covered. (Prerequisites: ILLS-219 or equivalent course.) **Lab 2, Credits 3 (Fall or Spring)**

ILLS-319**Digital Illustration II**

Digital Illustration II will provide students with advanced methods of conceptualizing, organizing and executing illustrations using the computer. Projects will expose students to various types of digital techniques using vector and raster-based software applications, and a variety of input and output devices for the creation of professional level assignments. The course will emphasize conceptual problem-solving methodology and the language of visualization while providing a consistent foundation for digital illustration as it relates to professional illustration production. Color systems, digital terminology and pre-press file formats will be also be covered. (Prerequisites: ILLS-219 or equivalent course.) **Studio 3, Credits 3 (Fall or Spring)**

ILLS-358**Dimensional Illustration II**

This course will offer students the option to continue an exploration of three-dimensional illustration. Emphasis is placed on creative problem solving, drawing skills, planning, preparation, compositional elements of three-dimensional low relief and sculptural form. Students are encouraged to explore a singular medium to complete projects in series presented in a consistent style. (Prerequisites: FDTN-111 or ITDI-211 or SOFA-108 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring)**

ILLS-358**Dimensional Illustration II**

This course will offer students the option to continue an exploration of three-dimensional illustration. Emphasis is placed on creative problem solving, drawing skills, planning, preparation, compositional elements of three-dimensional low relief and sculptural form. Students are encouraged to explore a singular medium to complete projects in series presented in a consistent style. (Prerequisites: FDTN-111 or ITDI-211 or SOFA-108 or equivalent course.) **Studio 3, Credits 3 (Fall, Spring)**

ILLS-364**Editorial Illustration**

Students will take an in-depth look at creating images for the newspaper and magazine publishing industry. Emphasis will be placed on creating a wide variety of finished illustrations. The course will focus on the visual interpretation of editorial subject matter. Critical thinking, visual criticism, and rhetoric will also be a required component of work generation and conceptualizing. Presenting thumbnails that explore a variety of concepts is emphasized. This course may be retaken one time. (Prerequisites: ILLS-213 or equivalent course.) **Studio 5, Credits 3 (Fall or Spring)**

ILLS-369**Digital Mixed Media**

This course provides students with the opportunity to explore the creative potential presented through the imaginative combination of both traditional and digital media. Students will be expected to utilize and combine skills learned in traditional and digital illustration courses to provide exciting and fresh illustrations unrestricted by a singular medium. (Prerequisites: ILLS-213 and ILLS-219 or equivalent courses.) **Lab 2, Credits 3 (Spring)**

ILLS-369**Digital Mixed Media**

This course provides students with the opportunity to explore the creative potential presented through the imaginative combination of both traditional and digital media. Students will be expected to utilize and combine skills learned in traditional and digital illustration courses to provide exciting and fresh illustrations unrestricted by a singular medium. (Prerequisites: ILLS-213 and ILLS-219 or equivalent courses.) **Studio 3, Credits 3 (Spring)**

ILLS-371**2D/3D Pre-Visual World Building**

Students will research visual standards that are employed to develop game and entertainment worlds. Each student is required to select a fictional world, which is then dissected, analyzed in its constituent parts, and reassembled, with emphasis on how elements interrelate to create a coherent whole. The wide range of possible subjects provides unlimited opportunities for exploration and development of individual styles and expressions. Students produce research materials, sketches and models of the chosen environment. (Prerequisites: ILLS-209 and ILLS-213 or equivalent course.) **Studio 5, Credits 3 (Fall or Spring)**

ILLS-373**Concept and Story-Inspired Art**

Students create images that visually represent new narratives or scenarios derived from existing games, animation, films, and/or themed concepts. They develop their individual methods for visualizing materials, props, wardrobes, and other objects that match their chosen theme. Initially, the class focuses on representing ideas through painting and sketching. The latter portion of the course translates these studies into digital 2D and/or 3D assets according to their intended use. (Prerequisites: ILLS-213 or ILLS-219 or equivalent course.) **Studio 6, Credits 3 (Spring)**

ILLS-399

Illustration Part-Time Co-op

Cooperative Education will provide Illustration students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in ILLS-BFA with at least 2nd year standing and department permission to enroll.) **CO OP, Credits 0 (Fall, Spring, Summer)**

ILLS-413

Illustration III

This course will focus on preparing students to function as professional working illustrators. Students will prepare and supply professional business materials such as job cost estimates, work and job delivery schedules, etc. along with assignment work. Emphasis will be placed on the development and creation of a variety of finished illustrations that will demonstrate understanding of current industry standards. Students will gain insight into pricing, time management, and effective communication relative to the illustration profession. Creative problem solving, stylistic self-expression, and technical proficiency will also be emphasized. Students will participate in individual and group reviews and critiques. (Prerequisites: ILLS-313 or equivalent course.) **Studio 5, Credits 3 (Fall, Spring)**

ILLS-461

Illustration History

This course will provide students with a historical overview and discussion of the field of illustration. Students will be presented with illustration in a developmental context. Visual examples, illustrator's biographies, descriptive information, and terminology will define and distinguish illustration and provide topics for discussion. The course will cover revolutionary illustrators, evolutionary trends, and styles from 1880 to the present. Special emphasis will be placed on particular illustrators whose artistic contributions to the field have defined and influenced changes and new movements. Work in traditional mediums and more recent digital mediums will be covered. (Prerequisites: FDTN-112 and FDTN-121 or equivalent courses.) **Studio 5, Credits 3 (Fall)**

ILLS-465

Book Illustration

This course will focus on preparing students to create work for the book publishing industry. Emphasis will be placed on creating a wide variety of finished illustrations that will appeal to picture book markets as well as a range of other publishing categories. To create a basis for their illustrations, students will visualize existing narratives and/or author their own story concepts. This will involve story development and storyboard conceptualization. Creative expression and technical experimentation will be encouraged. The course will culminate with the student creating a completed "dummy" suitable for presentation to book publishers. (Prerequisites: ILLS-219 or equivalent course.) **Studio 5, Credits 3 (Fall, Spring)**

ILLS-466

Personal Focus

This course requires students to create several illustrations on a topic, genre, or market relating to personal interests, experiences, directions, portfolio requirement, and career goals. Emphasis will be placed on the display of the student's individual aesthetic choices including realism or stylization, personal color palette, characterization, compositional sense, and other considerations. Works may be thematic or individualistic in content. Although this is not an independent study course, students will be expected to create a plan of work for the course in consultation with the instructor. **Studio 5, Credits 3 (Fall)**

ILLS-467

Animating Digital Illustration

Animating Digital Illustration will provide an introduction to illustrating for multimedia projects by creating computer generated animations and presentations. Current standards of imaging and motion software will be utilized. Assignments will investigate illustrated animation, sound, music, color, and special effects. The course will emphasize conceptual problem-solving methodology, color systems, digital terminology and motion file formats. (Prerequisites: ILLS-219 or equivalent course.) **Studio 6, Credits 3 (Fall or Spring)**

ILLS-468

Fantastic Illustration

This course will focus on the visual interpretation of subject matter specific to these specialized genres of illustration. Emphasis will be placed on creating a wide variety of finished illustrations. Critical thinking, visual criticism, and rhetoric will also be a required component of work generation and imaginative conceptualizing. Stylistic options and technical approaches to the subject matter will be emphasized. **Studio 5, Credits 3 (Fall)**

ILLS-472

Sketchbook Illustration

This course will facilitate the use of sketchbooks as a creative, developmental tool for illustrators and artists. Students will complete assignments by draw on location and in class to explore subjects and environments to create a visual reference material in the form of a sketchbook journal. Material documented in the sketchbook will then provide visual reference for more complete illustrations. **Studio 5, Credits 3 (Spring)**

ILLS-477

Caricature Illustration

This course will provide an in depth look and practice at creating humorous, symbolic or acerbic images of people for this specialized area within the field of Illustration. Assignments will challenge students to create characters for a variety of purposes and media. Emphasis will be placed on interpreting facial expressions, body postures, and clothing. Students will work in black and white and in color media producing a wide variety of finished illustrations. Students will be instructed in production methodologies, character diagramming, and color systems. **Studio 5, Credits 3 (Spring)**

ILLS-482

Political Cartooning

Political Cartooning is an introduction to this very popular, humorous approach of illustration that is widely used by newspaper and magazine publishers. Students will apply humorous, satirical, ironic, etc. content to their illustrations. Research, brainstorming, and exploration of techniques and media are emphasized. The history of visual joke telling is reviewed. **Studio 6, Credits 3 (Spring)**

ILLS-498

Illustration Internship

The illustration internship will provide students with the option to work in the illustration or visual communication field. Students may apply for internships to businesses based on the availability of positions and business job needs. Students must obtain permission of an instructor and complete the Internship Permission Form to enroll. (Enrollment in this course requires permission from the department offering the course.) **Internship, Credits 1 - 6 (Fall, Spring)**

ILLS-499

Illustration Co-op

Cooperative Education will provide Illustration students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Enrollment in this course requires permission from the department offering the course.) **CO OP, Credits 0 (Fall, Spring, Summer)**

ILLS-501

Illustration Portfolio

Illustration Portfolio is the final preparatory course for the Illustration major. Its purpose is to provide students with information, strategies and guided instruction to market themselves and organize and create their final portfolio. Writing will be a substantial component of this course. The course will include marketing and business practices for the professional illustrator. Students will receive individual critique and analysis of work created in prior studio classes and progress to the definition of a career agenda. Projects will be customized for each student's body of work and their career intentions. Presentation methods and business protocol will also be addressed. The final culminating project will be a finished portfolio. In addition to the portfolio document, students will be instructed in job seeking strategies including creating mailers and promotional materials, interviewing dynamics, resume writing, and correspondence. (Prerequisites: Completion of First Year Writing (FYW) requirement is required prior to enrolling in this class.) **Studio 5, Credits 3 (Spring)**

ILLS-550

Topics in Illustration

This course will focus on the investigation of, and practice in, a selected topic in illustration. Subject offerings will vary by sub-field specializations in the illustration field. A subtopic course description will be published each term course is offered and may have limited repeatability. The course, however can be repeated. **Lab 3, Credits 3 (Fall, Spring)**

ILLS-550

Topics in Illustration

This course will focus on the investigation of, and practice in, a selected topic in illustration. Subject offerings will vary by sub-field specializations in the illustration field. A subtopic course description will be published each term course is offered and may have limited repeatability. The course, however can be repeated. **Lecture 2, Credits 3 (Fall, Spring)**

ILLS-559

Illustrative Design

Illustrative Design is an introduction to the principles and methods used to incorporate illustration with typography and layout. Students will conceptualize, organize and execute illustrations within a design context. Illustrative Design will emphasize the use of graphic elements such as symbols, charts, and type to be incorporated into illustrations. Layout terminology and illustration production methods will be included. Projects will expose students to various examples of current, real-world assignments that will demand the use of traditional illustration methods as well as computer-based production media. Assignments will stress solutions that are typically managed by art directors and designers. The course will emphasize the language of visualization and the relationship and coordination of concept, illustration and word. This course may be repeated once for a total of six credits. (Prerequisites: ILLS-219 or equivalent course.) **Studio 6, Credits 3 (Fall)**

ILLS-562**Journalistic Illustration**

This course will familiarize students with the requirements of visually reporting a specific happening or event. Assignments will be longer in duration and will consist of several major works, many drawings, sketches, notes and photo references. This journalistic approach to illustration demands that students attend an event and selectively record important aspects that will best communicate the atmosphere and action of the scene. Extensive research, both informational and visual is expected. A personal, editorial viewpoint is desired. This course will familiarize students with methods and issues involving creating a series of images for the single purpose of representing a story or illustrated sequence. Emphasis will be placed on choosing important content and planning effective image sequences. Students will learn to share their observations to clarify and embellish what might be commonplace for the non-visual observer. (Prerequisites: ILLS-213 or equivalent course.) **Studio 5, Credits 3 (Spring)**

ILLS-563**Zoological and Botanical Illustration**

This course utilizes subjects found in the natural world as resources for applied and fine art applications. Working from live and preserved subjects, students will accurately depict animal and plant images, which may be used descriptively in print and electronic media. (Prerequisites: FDTN-112 and FDTN-122 or ILLS-206 or equivalent courses.) **Studio 6, Credits 3 (Fall, Spring)**

ILLS-568**Pop-Up Books**

This course will deal with constructing and illustrating pop-up and mechanical books. Students will study planning, preparation, engineering and illustration for production of pop-ups. The course will be divided into a preliminary section of learning basic mechanisms of pop-up books and a second section, which allows students to apply knowledge learned in the first section to the illustration and production of their own book. (Prerequisites: ILLS-218 or equivalent course.) **Studio 6, Credits 3 (Fall)**

ILLS-569**Advertising Illustration**

This course will deal with creating illustrations used to advertise products, services and events. Assigned projects will give students a better understanding of the wide range of assignments advertising illustrators are asked to produce by advertising agencies and corporate accounts. Students will experience the fast paced working conditions inherent in the advertising industry. **Studio 5, Credits 3 (Fall, Spring)**

ILLS-579**Digital Editorial**

Digital Editorial will introduce students to editorial illustration. Importance will be placed on interpretation of editorial subject matter and preparation of digital imagery for print reproduction. Students will apply approaches to creative illustration while creatively interpreting editorial text and visual narratives. Students may use vector and raster-based software applications and a variety of input and output devices. Stylistic issues, conceptual strategies, production restrictions, and color systems will also be covered. (Prerequisites: ILLS-213 and ILLS-219 or equivalent courses.) **Studio 5, Credits 3 (Spring)**

ILLS-599**Illustration Independent Study**

Illustration Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser will propose a course of study. Illustration Independent Study students must obtain permission of an instructor and complete the Independent Study Permission Form to enroll. (This course requires permission of the Instructor to enroll.) **Ind Study, Credits 1 - 6 (Fall, Spring)**

Medical Illustration

ILLM-399**Medical Illustration Part-Time Co-op**

Cooperative Education will provide Medical Illustration students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Enrollment in this course requires permission from the department offering the course.) **CO OP, Credits 0 (Fall, Spring, Summer)**

ILLM-498**Medical Illustration Internship**

The medical illustration internship will provide students with the option to work with practicing professionals in a business or educational environment. Students may apply for internships to businesses and educational institutions based on the availability of positions and company needs. Students must obtain permission of an instructor and complete the Internship Permission Form to enroll. (Enrollment in this course requires permission from the department offering the course.) **Internship, Credits 1 - 6 (Fall, Spring)**

ILLM-499**Medical Illustration Co-op**

Cooperative Education will provide Medical Illustration students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Enrollment in this course requires permission from the department offering the course.) **CO OP, Credits 0 (Fall, Spring, Summer)**

ILLM-501**Human Gross Anatomy**

An in-depth study of the structure of the human body. Emphasis is on understanding the relationships between anatomical structures as well as their form, texture, and color. Dissection of a human cadaver is supplemented with lectures on the structure and function of the major organ systems. (Prerequisites: MEDS-251 or equivalent course.) **Lab 9, Credits 6 (Fall)**

ILLM-501**Human Gross Anatomy**

An in-depth study of the structure of the human body. Emphasis is on understanding the relationships between anatomical structures as well as their form, texture, and color. Dissection of a human cadaver is supplemented with lectures on the structure and function of the major organ systems. (Prerequisites: MEDS-251 or equivalent course.) **Lecture 3, Credits 6 (Fall)**

ILLM-502**Illustrating Human Anatomy**

Drawings of lab dissections and the skeleton will be translated into illustrations designed to support instruction in Human Gross Anatomy. Course teaches what choices need to be made when translating literal drawings into illustrations that support instruction. The target learner for these illustrations is a student attending Human Gross Anatomy at a graduate level. (Prerequisites: ILLS-214 or equivalent course.) **Studio 6, Credits 3 (Fall)**

ILLM-503**3D Modeling of Organic Forms**

This course introduces strategies used to create NURBS and polygonal models of organic subjects in a three-dimensional environment. Assignments stress accurate portrayal of proportions, form, and texture. Instruction will also focus on creating lighting and shader networks that emphasize form and are consistent with surface characteristics. (Prerequisites: FDTN-131 or equivalent course.) **Studio 6, Credits 3 (Fall)**

ILLM-506**3D Animation of Organic Forms**

This course explores animating biomedical subjects and processes in their native environment to create illustrations. Students will be asked to research and create illustrations that animate their findings. Frame by frame animation, blend shapes, non-linear deformers and "rigging" systems will be introduced to permit students to choose the most effective method for creating motion and transformation. (Prerequisites: ILLM-503 or equivalent course.) **Studio 6, Credits 3 (Spring)**

ILLM-507**Computer Applications in Medical Illustration**

Students will learn to use industry-standard raster and vector illustration software to create graphics of medical subjects. Students will also use page layout applications to combine digital images with text and other graphic elements. Course work emphasizes creation of illustrations to support medical education and publishing. (Prerequisites: FDTN-111 and FDTN-121 or equivalent courses.) **Studio 6, Credits 3 (Spring)**

ILLM-508**Scientific Visualization**

Emerging technologies enable scientists to visualize structures that are otherwise invisible to the naked eye. For example, molecular visualization software allows us to construct highly accurate molecular models from X-ray crystallography and other structural data. Cryo-EM and confocal microscopy are revealing the previously unknown structure of cellular organelles. Medical imaging systems allow us to reconstruct the human body in three dimensions from actual patient data (CT scans, MRI, etc.). This course explores the use of these technologies to provide references for traditional artwork and to export models for digital rendering and animation. (Prerequisites: ILLM-501 and ILLM-507 or equivalent courses.) **Studio 6, Credits 3 (Spring)**

ILLM-512**Surgical Illustration**

Students observe live surgical procedures and translate their sketches into finished illustrations that are used in medical training, patient education, and litigation. Demonstrations of sketching and rendering techniques are supplemented with lectures on general surgical principles and common procedures. (Prerequisites: ILLM-501 and ILLM-507 or equivalent courses.) **Studio 6, Credits 3 (Fall)**

ILLM-515**Contemporary Media I**

This course will introduce students to computer illustration, animation, and interactive media as applied to contemporary methods of instruction in medicine and allied health. Students will develop interactive design pieces to support instruction lessons for the educational health care field. (Prerequisites: ILLM-506 or equivalent course.) **Studio 6, Credits 3 (Fall)**

College of Art and Design

ILLM-516

Contemporary Media II

This is the second of two courses on the development of student-created interactive media designed to assist in the teaching of medicine and allied health. The course will build off the foundation created in Contemporary Media 1. At the completion of this course, students will be able to create advanced topics in two-dimensional computer illustration, animation, and interactive media for instruction in medicine and allied health. (Prerequisites: ILLM-515 or equivalent course.) **Studio 6, Credits 3 (Spring)**

ILLM-517

Portfolio and Business Practices

This course will prepare students to enter the workforce in fulltime positions or as freelance illustrators. Students will create a portfolio, personal identity package, and marketing materials. The course content will introduce students to business concepts such as copyright, licensing, pricing, contracts, taxation, and formation of a proper business. (This course is restricted to 4th year students in the ILLM-BFA program who have completed First-Year Writing.) **Lab 3, Credits 3 (Spring)**

ILLM-517

Portfolio and Business Practices

This course will prepare students to enter the workforce in fulltime positions or as freelance illustrators. Students will create a portfolio, personal identity package, and marketing materials. The course content will introduce students to business concepts such as copyright, licensing, pricing, contracts, taxation, and formation of a proper business. (This course is restricted to 4th year students in the ILLM-BFA program who have completed First-Year Writing.) **Lecture 2, Credits 3 (Spring)**

ILLM-518

Eye Ear and Nose Prosthetics

Eye Ear Nosemaking is an introduction to maxillofacial prosthetics. Focusing on anaplastology with additional work in the process of artificial eye-making, students will create life masks on which orbitals, noses and ears can be modeled, cast and produced. **Fee: There is a \$45 fee required for this course** (Prerequisites: FDTN-111 or ITDI-211 or SOFA-108 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

ILLM-518

Eye Ear and Nose Prosthetics

Eye Ear Nosemaking is an introduction to maxillofacial prosthetics. Focusing on anaplastology with additional work in the process of artificial eye-making, students will create life masks on which orbitals, noses and ears can be modeled, cast and produced. **Fee: There is a \$45 fee required for this course** (Prerequisites: FDTN-111 or ITDI-211 or SOFA-108 or equivalent course.) **Studio 3, Credits 3 (Spring)**

ILLM-550

Studio Topics in Medical Illustration

This topic course will explore a selected traditional or contemporary process, technique, medium or material used in creating medical illustration artwork. A subtopic course description will be published each term the course is offered. This course may be repeated, however the topic may not be repeated. (This course is restricted to Undergraduate College of Art and Design YR 3-4 students.) **Studio 6, Credits 3 (Fall, Spring)**

ILLM-599

Medical Illustration Independent Study

Medical Illustration Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser will propose a course of study. Medical Illustration Independent Study students must obtain permission of an instructor and complete the Independent Study Permission Form to enroll. (This course requires permission of the Instructor to enroll.) **Ind Study, Credits 1 - 6 (Fall, Spring)**

Painting

PAIT-201

Introduction to Painting

This course will explore techniques in painting to advance students' understanding of subjects such as color theory, building compositions and the effective use of painting materials. Individual approaches to content range from abstraction through representational art, as students address contemporary visual arts issues. * Fee: There is a course fee applied via student account. * (Prerequisite: FDTN-111 or DDDD-208 or ITDI-211 or SOFA-108 or equivalent course.) **Studio 6, Credits 3 (Fall or Spring)**

PAIT-233

Painting for Non-Majors

This course will allow students to experience and explore the properties of oil painting and establish strategies toward solving problems of composition related to successful form content. *Fee: A materials fee is required for this course * (This class is open to all undergraduate students except for those in the FNAS-BFA, ILLM-BFA, ILLS-BFA, GRDE-BFA, INDE-BFA, IDDE-BFA, NMDE-BFA, CCER-BFA, GLASS-BFA, METAL-BFA, STAR-BFA, and WOOD-BFA majors.) **Studio 6, Credits 3 (Fall, Spring)**

PAIT-460

Watercolor

This course will focus on the exploration of watercolor concepts and techniques to enhance skills and personal expression of the individual student. **Fee: A materials fee is required for this course** (Prerequisites: FDTN-111 or equivalent course.) **Studio 6, Credits 3 (Fall, Spring)**

PAIT-501

Painting

This course engages students in contemporary visual art practice through a personal exploration of painting techniques. Individual approaches to painting address issues of representation and abstraction to build a portfolio for further career advancement. Course may be repeatable. **Fee: A materials fee is required for this course** (Prerequisites: (C or better in PAIT-201 or PAIT-233) and (ITDI-211 or FDTN-111) or equivalent courses.) **Studio 6, Credits 3 (Fall, Spring)**

PAIT-561

Painting the Natural World

This class will examine the natural world in our current culture using technical aspects of oil paint. Course content will cover the transition from direct observation to conceptual work. Students will create a body of artwork referencing assigned readings and personally-driven research relating to contemporary themes, such as identity, the body, time, memory, place, language, science, spirituality, and connection to nature. At the completion of this course, students will be able to use the skills from a technical overview of observational painting to create paintings exploring developed ideas based on research. **Fee: A course fee applied via student account. ** (Prerequisites: FDTN-111 or DDDD-208 or ITDI-211 or SOFA-108 or equivalent course.) **Studio 6, Credits 3 (Fall or Spring)**

PAIT-571

Painting the Figure

This course will explore materials and techniques used in painting the human form. Theory and practice of color and drawing will be used to develop an understanding of how to portray the figure. Traditional and contemporary approaches to figurative painting will be explored. **Fee: There is a materials fee required for this course and an additional course fee applied via student account. ** (Prerequisites: FDTN-111 or equivalent course.) **Studio 6, Credits 3 (Fall, Spring)**

Printmaking

PRNT-201

Introduction to Printmaking

This course is a comprehensive introduction to printmaking concepts and techniques. Organized to create a broad introductory experience, the course will focus on the expansion of problem solving and skill building within the context of printmaking. The course addresses a wide variety of media, tools, techniques both traditional and technological, and theoretical concepts to facilitate skill development and experimentation with process. Accumulative aspects of the curriculum include the exploration of historical and cultural concepts of materiality and the multiple intertwined with aspects of personal interpretation and experience. **Fee: There is a course fee applied via student account. ** (Prerequisites: FDTN-111 or ITDI-211 or equivalent course.) **Studio 6, Credits 3 (Fall or Spring)**

PRNT-501

Printmaking

This course is designed to introduce advanced non-toxic printmaking concepts and techniques. The focus will be on non-toxic intaglio printmaking research and how to creatively apply techniques that will result in sophisticated works of art. Course may be repeated. **Fee: There is a lab fee required for this course** (Prerequisites: PRNT-201 or equivalent course.) **Studio 6, Credits 3 (Fall, Spring)**

PRNT-502

Photo Print Processes

This course explores photographic printmaking techniques, including screenprinting on paper and glass surfaces. Course content and discussions will focus on the relationship and relevancy of printmaking processes to photographic imagery. At the completion of this course, students will understand the formal and conceptual implications of media, process and form. **Fee: A materials fee is required for this course, and an additional course fee applied via student account** **Studio 6, Credits 3 (Fall or Spring)**

Studio Arts

STAR-201

Crafts Drawing Practice

This is the first of a two-semester class covering basic freehand sketching and measured drawing techniques for both design and presentation. Topics covered will include a broad range of drawing types, architectural conventions and presentation strategies. The course includes lectures, group discussions, independent study, homework, drawing and oral presentations. Each semester long course is structured as an independent unit. (This course is restricted to students in the CCER-BFA, GLASS-BFA, WOOD-BFA, STAR-BFA and METAL-BFA programs.) **Lecture 3, Credits 3 (Fall)**

STAR-268**Bookbinding**

This course is an introduction to the many different binding options ranging from saddle-stitched pamphlets to hardcover books, as well as the wide range of materials available. Contemporary procedures of finishing on demand publications are part of this course. Students are encouraged to bring with them some personal projects for binding. No prerequisites are required; however, good manual dexterity is desired. **Fee: A materials fee is required for this course** (This course is available to RIT degree-seeking undergraduate students.) **Studio 6, Credits 3 (Fall, Spring)**

STAR-301**Digital Fabrication Applications for the Studio**

This course will examine the context and application of digital fabrication in relation to a student's individual art practices. Course content will cover additive and subtractive manufacturing and the prerequisite programs for each process. Students will explore techniques to produce either tools or final art objects. Historical and contemporary perspectives will be introduced. At the completion of this course, students will apply technical skills and an understanding of how their personal artwork and technology intersect. **Fee: A materials fee is required for this course and an additional course fee applied via student account.** (Prerequisite: (FDTN-112 or FDTN-212) and (STAR-202 or INDE-202 or IDDE-212) or equivalent courses.) **Lab 2, Credits 3 (Fall, Spring)**

STAR-301**Digital Fabrication Applications for the Studio**

This course will examine the context and application of digital fabrication in relation to a student's individual art practices. Course content will cover additive and subtractive manufacturing and the prerequisite programs for each process. Students will explore techniques to produce either tools or final art objects. Historical and contemporary perspectives will be introduced. At the completion of this course, students will apply technical skills and an understanding of how their personal artwork and technology intersect. **Fee: A materials fee is required for this course and an additional course fee applied via student account.** (Prerequisite: (FDTN-112 or FDTN-212) and (STAR-202 or INDE-202 or IDDE-212) or equivalent courses.) **Studio 2, Credits 3 (Fall, Spring)**

STAR-311**Ideation and Series**

This course will examine appropriate skills and strategies to generate ideas and develop them effectively. Through personal and group generative idea exercises, journaling and research. Students will explore individual ideas and personal interests a final series of creative works. (Prerequisites: FDTN-141 or equivalent course.) **Studio 6, Credits 3 (Fall or Spring)**

STAR-399**Studio Arts Part-Time Co-op**

Cooperative Education will provide Studio Arts students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in STAR-BFA with at least 2nd year standing and department permission.) **CO OP, Credits 0 (Fall, Spring, Summer)**

STAR-401**Senior Capstone**

This course will focus on the production and exhibition of a representative body of artwork. Students will participate in an articulated process of making, engaging in comprehensive research that expands and supports their work, developing a rationale for the use of media and process, creating sketches and models, and the refining work through critiquing and editing. All of this will culminate in the professional presentation of oral, written, and visual work that contextualizes the students' positions within contemporary artistic practice. Students will also be involved in every aspect of their senior shows from creating the work to installing the exhibition and preparing marketing materials. (Prerequisites: STAR-311 or equivalent course.) **Studio 6, Credits 3 (Spring)**

STAR-405**Fine Art Drawing**

This class is devoted to building upon each student's skills in drawing with attention to use of a variety of mark making materials and surfaces. Drawing uses perceptual and conceptual approaches to creative visual art making. Students engage in issues of representation and abstraction through relationships of marks, lines and other graphic notations. Contemporary drawing can focus on direct observations or imaginative compositions among many other valid approaches. (Prerequisite: FDTN-112 or FDTN-212 or SOFA-108 or IDDE-102 or equivalent course.) **Studio 6, Credits 3 (Fall)**

STAR-411**Business Practices for Artists**

This course is devoted to business issues that artists must address including building and maintaining a portfolio, pricing and marketing strategies and public relations. Financial organization and communication skills are highlighted as are networking skills for the advancement of an artist's work. (Prerequisites: (STAR-311 or CCER-302 or CCER-512 or CWFD-302 or CGLS-302 or CMTJ-302 or equivalent course and completion of First Year Writing (FYW) requirement) or student standing in WOOD-AOS.) **Lecture 3, Credits 3 (Fall)**

STAR-498**Studio Arts Internship**

The Studio Arts Internship will provide students with the option to work with established artists or in fine art-related businesses. Students may apply for internships to businesses based on the availability of positions and business needs. Students must obtain permission of an Undergraduate Program Director and complete the Internship Permission Form to enroll. (Prerequisites: This class is restricted to students in STAR-BFA with at least 2nd year standing and department permission.) **Internship, Credits 1 - 6 (Fall, Spring)**

STAR-499**Studio Arts Co-op**

Cooperative Education will provide Studio Arts students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in STAR-BFA with at least 2nd year standing and department permission.) **CO OP, Credits 0 (Fall, Spring, Summer)**

STAR-502**STAR Capstone**

This course provides students with a capstone experience focused on the execution and exhibition of a culminating body of artwork. Students will also learn how to prepare professional presentations about their work through oral, written, and visual within the context of the contemporary art world. Group discussions, source presentations, material experiments, and presentation aspects will all be addressed. (Prerequisites: STAR-311 or CCER-501 or CGLS-501 or CMTJ-501 or CWFD-501 or equivalent course.) **Studio 6, Credits 3 (Spring)**

STAR-503**CAD Drawing**

This class covers basic CAD (computer-aided design) drawing for both design and presentation. Topics covered will include a broad range of drawing types, three-dimensional modeling, and presentation techniques. The course includes demonstrations, lectures, group-discussions, projects, and presentations. At the completion of this course students will use skills obtained in CAD orthographic drawing and 3-dimensional modeling to refine and present ideas and projects. **Lec/Lab 5, Credits 3 (Fall or Spring)**

STAR-505**Figure Drawing**

This course will focus on building figure drawing skills in a traditional life drawing class format with emphasis on dynamic line quality, visual perception and contemporary approaches to figure drawing. Students will work directly from the model in a variety of media. At the completion of this course, students will gain an understanding of diverse representations and applications of the human figure using various drawing materials and processes. (Prerequisites: FDTN-111 or ITDI-211 or ITDI-236 or SOFA-108 or equivalent course.) **Studio 6, Credits 3 (Fall or Spring)**

STAR-535**Curating and Managing Art Spaces**

This course will explore the roles of contemporary, traditional, and alternative art spaces through curatorial studies, exhibition evaluation, and criticism. Student will consider gallery administrative roles and supporting operations, and undertake site visitations and gallery research. Students will organize and install a final exhibition project in an approved exhibition venue. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 3, Credits 3 (Fall)**

STAR-545**Art Exhibition Critique**

This course will explore the role of the art exhibition and its effect on the discourse and practice of art. Course content will focus on contemporary and historical exhibition studies, individual and group projects. Students will also conduct site visitations and evaluation, and critique work in the context of exhibition. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 3, Credits 3 (Spring)**

STAR-550**Top Studio Arts:**

This course will focus on traditional or contemporary processes, techniques, media or materials used in the creation of artwork. Topic will be determined by faculty teaching the course. A topic course description will be published each term the course is offered. This course can be retaken but individual topics may not. (This class is restricted to students with majors in CAD and at least 3rd year student standing.) **Studio 6, Credits 3 (Fall, Spring)**

College of Art and Design

STAR-555

CADD Applications in Studio Arts

An introduction to advanced CADD (Computer Aided Drawing and Design) techniques for modeling, presenting, and communicating artistic concepts. This course will explore the ways CADD process can be incorporated into the creative ideation and execution processes. Advantages of employing CADD process to determine efficient use of materials, engage in collaboration, and develop effective proposals will be covered. (Prerequisites: This class is restricted to students with at least 2nd year standing in CCER-BFA or GLASS-BFA or METAL-BFA or WOOD-BFA or STAR-BFA.) **Lab 4, Credits 3 (Fall, Spring)**

STAR-555

CADD Applications in Studio Arts

An introduction to advanced CADD (Computer Aided Drawing and Design) techniques for modeling, presenting, and communicating artistic concepts. This course will explore the ways CADD process can be incorporated into the creative ideation and execution processes. Advantages of employing CADD process to determine efficient use of materials, engage in collaboration, and develop effective proposals will be covered. (Prerequisites: This class is restricted to students with at least 2nd year standing in CCER-BFA or GLASS-BFA or METAL-BFA or WOOD-BFA or STAR-BFA.) **Lecture 2, Credits 3 (Fall, Spring)**

STAR-563

Contemporary Drawing

This course places an emphasis on drawing and the development of form, space and expression from a variety of sources. Course content will include traditional drawing mediums and practices to exploration of unusual materials, concepts, and mark-making. Students will develop an individual mode of expression through drawing and surface exploration as well as an understanding of contemporary practices. At the completion of this course, students will create a body of work exploring developed ideas based on individual research with drawing as a practice. **Fee: A materials fee is required for this course.** (Prerequisites: FDTN-111 or ITDI-211 or equivalent course.) **Studio 6, Credits 3 (Fall, Spring)**

STAR-568

Letterpress Printmaking

This course will introduce the technologies of letterpress printing as applied to the creation of fine art prints. Students will generate several printed works using vintage metal and wood type set by hand, and then combine these traditional skills with innovative 21st century relief printing techniques. Students will learn platen and cylinder press printing and maintenance in order to make small editions of multi-color printed works. **Studio 6, Credits 3 (Fall or Spring)**

STAR-578

Screenprinting

This course is a comprehensive introduction to silkscreen printing concepts and techniques. Organized to create a broad introductory experience, the course will focus on the expansion of problem solving and skill building within the context of screen-printing. The course addresses a wide variety of media, tools, techniques both traditional and technological and the theoretical concepts to facilitate skill development and experimentation with process. Accumulative aspects of the curriculum include the exploration of historical and cultural concepts of materiality and the multiple, intertwined with aspects of personal interpretation and experience. **Fee: There is a lab fee required for this course** **Studio 6, Credits 3 (Fall, Spring)**

STAR-599

Studio Arts Independent Study

Studio Arts Independent Study will provide STAR students the opportunity to develop a specialized study course with an individual faculty member. Students, with the assistance of a faculty adviser, will propose a course of study, timeline and outcome for this course. Students must obtain permission of an instructor, be holding a 3.0 gpa and complete the Independent Study Permission Form to enroll. (Prerequisites: This class is restricted to students in FNAS-BFA or STAR-BFA with at least 2nd year standing and instructor permission.) **Ind Study, Credits 1 - 6 (Fall, Spring)**

School of Design

3D Digital Design

DDDD-101

Introduction to Modeling and Motion

This course is an introduction to the representation of form and motion in three-dimensional software. The course focuses on the development of visual and verbal vocabulary as a means of exploring, developing, and understanding composition and motion with digital geometry and in virtual spaces. Topics include the basics of lines, planes, contour, transforming lines into form, composing images with a software camera, interaction of light and surface, perspective, resolution of geometry, and rendering. Perception and visual thinking are emphasized in the development of projects. Projects will include modeling organic and inorganic forms, composition, level of detail, creation of spaces and motion. Structured assignments develop skills in concept generation, basic form making, techniques for creating motion, and craftsmanship. Emphasis is placed on workflow, teamwork, and the technical and aesthetic aspects of each project. **Lecture 2, Credits 3 (Fall)**

DDDD-101

Introduction to Modeling and Motion

This course is an introduction to the representation of form and motion in three-dimensional software. The course focuses on the development of visual and verbal vocabulary as a means of exploring, developing, and understanding composition and motion with digital geometry and in virtual spaces. Topics include the basics of lines, planes, contour, transforming lines into form, composing images with a software camera, interaction of light and surface, perspective, resolution of geometry, and rendering. Perception and visual thinking are emphasized in the development of projects. Projects will include modeling organic and inorganic forms, composition, level of detail, creation of spaces and motion. Structured assignments develop skills in concept generation, basic form making, techniques for creating motion, and craftsmanship. Emphasis is placed on workflow, teamwork, and the technical and aesthetic aspects of each project. **Studio 2, Credits 3 (Fall)**

DDDD-102

Introduction to Visual Design

This course is an introduction to the development of surface materials in three-dimensional software, using the basic concepts covered in Intro to Modeling and Motion. Principles of additive and subtractive color are developed as they relate to the interpretation of physical phenomena within a virtual world. The vocabulary expands to include the interaction of light and surface attributes including: color, relief, specularly, transparency, and more. Projects focus on using color, value and texture to enhance the representation of form and space. The basics of node based materials design is introduced. Additional techniques for UV layout are introduced. Concepts are introduced through lectures, discussions, demonstrations, research, assigned projects, and critiques. Assignments develop skills in surface design, lighting and rendering. (Prerequisites: This class is restricted to students who have completed DDDD-101 with a C or better or equivalent course.) **Lecture 2, Credits 3 (Spring)**

DDDD-102

Introduction to Visual Design

This course is an introduction to the development of surface materials in three-dimensional software, using the basic concepts covered in Intro to Modeling and Motion. Principles of additive and subtractive color are developed as they relate to the interpretation of physical phenomena within a virtual world. The vocabulary expands to include the interaction of light and surface attributes including: color, relief, specularly, transparency, and more. Projects focus on using color, value and texture to enhance the representation of form and space. The basics of node based materials design is introduced. Additional techniques for UV layout are introduced. Concepts are introduced through lectures, discussions, demonstrations, research, assigned projects, and critiques. Assignments develop skills in surface design, lighting and rendering. (Prerequisites: This class is restricted to students who have completed DDDD-101 with a C or better or equivalent course.) **Studio 2, Credits 3 (Spring)**

DDDD-103

Imaging for 3D

This course provides experience in generating images, both still and moving, for use with the three-dimensional software environment. Students learn techniques for drawing perspective and orthographic views as well as cabinet drawings, oblique drawings, and other techniques. Students learn to create curves to import for model creation, to capture images photographically to use as textures, to create wrapping textures, to compile multiple frames into a movie, to merge segments together into a single movie, to record and incorporate audio elements, and to export results to the web and other media. Students learn to use a green screen to add live elements to their work. (Prerequisite: DDDD-101 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

DDDD-103

Imaging for 3D

This course provides experience in generating images, both still and moving, for use with the three-dimensional software environment. Students learn techniques for drawing perspective and orthographic views as well as cabinet drawings, oblique drawings, and other techniques. Students learn to create curves to import for model creation, to capture images photographically to use as textures, to create wrapping textures, to compile multiple frames into a movie, to merge segments together into a single movie, to record and incorporate audio elements, and to export results to the web and other media. Students learn to use a green screen to add live elements to their work. (Prerequisite: DDDD-101 or equivalent course.) **Studio 2, Credits 3 (Spring)**

DDDD-201

Modeling and Motion Strategies

This course provides extensive coverage of methods for modeling where evaluation of the appropriate modeling method to use in various situations is key. The emphasis in the course is on problem solving. Modeling challenges of various types are incorporated into the projects. With these techniques students create complex models of organic and inorganic forms using many techniques. (Prerequisites: This class is restricted to students who have completed DDDD-101 with a C or better or equivalent course.) **Lab 2, Credits 3 (Fall)**

DDDD-201

Modeling and Motion Strategies

This course provides extensive coverage of methods for modeling where evaluation of the appropriate modeling method to use in various situations is key. The emphasis in the course is on problem solving. Modeling challenges of various types are incorporated into the projects. With these techniques students create complex models of organic and inorganic forms using many techniques. (Prerequisites: This class is restricted to students who have completed DDDD-101 with a C or better or equivalent course.) **Lecture 2, Credits 3 (Fall)**

DDDD-202**Layers and Effects**

Students learn to utilize render layers and to create effects using software that makes it possible to incorporate multiple layers of image and audio into a single project. Issues related to integrating images created using different renders is covered. Emphasis is placed on incorporating various elements into a cohesive whole matching lighting and perspective. (Prerequisites: DDDD-102 and DDDD-103 or equivalent course.) **Lab 2, Credits 3 (Spring)**

DDDD-202**Layers and Effects**

Students learn to utilize render layers and to create effects using software that makes it possible to incorporate multiple layers of image and audio into a single project. Issues related to integrating images created using different renders is covered. Emphasis is placed on incorporating various elements into a cohesive whole matching lighting and perspective. (Prerequisites: DDDD-102 and DDDD-103 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

DDDD-203**Scripting**

This course covers the use of scripts to control various aspects of three-dimensional environments, models, textures, motion, production workflow and more. Students develop scripts to control particles, models, textures, motion, and interaction with the environment. Additionally students gain experience downloading scripts to micro controllers. (Prerequisites: DDDD-101 or SOFA-215 or IGME-219 or equivalent course.) **Lab 2, Credits 3 (Fall)**

DDDD-203**Scripting**

This course covers the use of scripts to control various aspects of three-dimensional environments, models, textures, motion, production workflow and more. Students develop scripts to control particles, models, textures, motion, and interaction with the environment. Additionally students gain experience downloading scripts to micro controllers. (Prerequisites: DDDD-101 or SOFA-215 or IGME-219 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

DDDD-207**Lighting, Materials, and Rendering**

The course will focus on advanced techniques in lighting, materials, and rendering. Students will light objects and spaces. Students will use shading networks to incorporate groups of two-dimensional and three-dimensional textures into realistic and non-photorealistic materials. Students will learn to use texture maps instead of detail in models to increase interaction speeds. Textures are used to prototype simple models into complex scenes before completion of final geometry. Normal maps and displacement textures are used to create detail in model UVs. Use of the node-based system to control many aspects of the 3D environment is covered. Use of textures to simulate non-dynamic lights and shadows is introduced. Planning for the economical use of textures and for the replacement of models with texture maps in level of detail (LOD) situations will be addressed as well. Students will learn to design effective render layers and explore the strengths and weaknesses of various renderers to make effective judgments about which renderer to use in a given situation. (Prerequisites: DDDD-202 or equivalent course.) **Studio 3, Credits 3 (Spring)**

DDDD-207**Lighting, Materials, and Rendering**

The course will focus on advanced techniques in lighting, materials, and rendering. Students will light objects and spaces. Students will use shading networks to incorporate groups of two-dimensional and three-dimensional textures into realistic and non-photorealistic materials. Students will learn to use texture maps instead of detail in models to increase interaction speeds. Textures are used to prototype simple models into complex scenes before completion of final geometry. Normal maps and displacement textures are used to create detail in model UVs. Use of the node-based system to control many aspects of the 3D environment is covered. Use of textures to simulate non-dynamic lights and shadows is introduced. Planning for the economical use of textures and for the replacement of models with texture maps in level of detail (LOD) situations will be addressed as well. Students will learn to design effective render layers and explore the strengths and weaknesses of various renderers to make effective judgments about which renderer to use in a given situation. (Prerequisites: DDDD-202 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

DDDD-208**Anatomical Figure Drawing**

Lessons introduced in lecture will be applied during figure drawing sessions. These lessons describe a proportion system developed by Robert Beverly Hale to define the human skeleton. After studying the skeleton, the course focuses on all major muscle groups and their influence on the human form. **Lab 3, Credits 3 (Spring)**

DDDD-208**Anatomical Figure Drawing**

Lessons introduced in lecture will be applied during figure drawing sessions. These lessons describe a proportion system developed by Robert Beverly Hale to define the human skeleton. After studying the skeleton, the course focuses on all major muscle groups and their influence on the human form. **Studio 3, Credits 3 (Spring)**

DDDD-209**Project Planning and Production**

In this course students learn to develop design documents, timelines, budgets, marketing plans, and supporting material for potential projects. A project of their own design is then fully implemented and presented at the end of the term. (Prerequisites: DDDD-102 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

DDDD-209**Project Planning and Production**

In this course students learn to develop design documents, timelines, budgets, marketing plans, and supporting material for potential projects. A project of their own design is then fully implemented and presented at the end of the term. (Prerequisites: DDDD-102 or equivalent course.) **Studio 2, Credits 3 (Spring)**

DDDD-301**Professional Practice**

The course focuses on preparing students to enter the professional world. Projects include the development of a resume, cover letter, artist's statement, bio, and portfolio. Focus is placed on submitting work to competitions, both visual and written, related to their work. (Prerequisites: DDDD-103 or equivalent course and completion of First Year Writing (FYW) requirement.) **Lecture 3, Credits 3 (Fall)**

DDDD-302**History of 3D Digital Design**

This course will focus on three-dimensional design, covering the development of digitally based 3D graphics and imagery from their prehistory to the present. Additionally, the course will explore related technologies and the growth of the computer graphics industry. Major pioneers and their contributions to the field are reviewed. The course traces the use of 3D digital tools in the creation of graphics for design, interactive media, fine art, animation, visualization, and performance: providing students with a solid foundation in the history and development of the discipline. **Lecture 3, Credits 3 (Fall)**

DDDD-303**Collaboration Project**

This course contextualizes mid-career acquired technical and aesthetic 3D Digital Design skills within a professional production setting. Students join or are assigned to collaborative teams that work with internal or external clients in the design, development, and completion of a long-form 3D Digital Design project that meets specific client-centered goals. Project scope, outcomes, milestones, deadlines and deliverables are negotiated and agreed upon between the client and the student team. The course focuses on the development of collaboration skills among the team members, and in the differentiation between team objectives and individual goals. Students will learn the process of clear communication with a client in a professional setting. (Prerequisites: DDDD-209 or equivalent course.) **Lab 2, Credits 3 (Fall or Spring)**

DDDD-303**Collaboration Project**

This course contextualizes mid-career acquired technical and aesthetic 3D Digital Design skills within a professional production setting. Students join or are assigned to collaborative teams that work with internal or external clients in the design, development, and completion of a long-form 3D Digital Design project that meets specific client-centered goals. Project scope, outcomes, milestones, deadlines and deliverables are negotiated and agreed upon between the client and the student team. The course focuses on the development of collaboration skills among the team members, and in the differentiation between team objectives and individual goals. Students will learn the process of clear communication with a client in a professional setting. (Prerequisites: DDDD-209 or equivalent course.) **Lecture 2, Credits 3 (Fall or Spring)**

DDDD-304**3D Motion Graphics**

This course addresses the technical and aesthetic concerns in the production of 3D motion graphics for various implementations, including station identifications for television networks, film titles, public service broadcast, music video, scoreboard graphics and logos for advertising. The course also examines current trends and implications for future application of 3D motion graphics in the broader field of 3D communication design. Major areas of focus are the use of three-dimensional typography, design development and presentation, screen composition, timing, transition and content. 3D Visual Effects as they pertain to 3D motion graphics are also addressed. (Prerequisite: DDDD-101 or equivalent course.) **Lab 3, Credits 3 (Fall or Spring)**

DDDD-304**3D Motion Graphics**

This course addresses the technical and aesthetic concerns in the production of 3D motion graphics for various implementations, including station identifications for television networks, film titles, public service broadcast, music video, scoreboard graphics and logos for advertising. The course also examines current trends and implications for future application of 3D motion graphics in the broader field of 3D communication design. Major areas of focus are the use of three-dimensional typography, design development and presentation, screen composition, timing, transition and content. 3D Visual Effects as they pertain to 3D motion graphics are also addressed. (Prerequisite: DDDD-101 or equivalent course.) **Lecture 2, Credits 3 (Fall or Spring)**

DDDD-305**3D Interactive Storytelling**

This course focuses on developing and implementing digital narratives with two and three-dimensional computer graphics. Through short creative assignments and larger projects, students will have the opportunity to work with multimedia tools to create new forms of branching and circular narratives, as well as integrate interactivity to 3D environments. Students will create fiction narrative prototypes that explore the intersections of story, interface, networks, and games, in contemporary interactive media. Coursework will include reading, writing, design concepts, design documents and narrative prototype development. (Prerequisite: DDDD-101 or equivalent course.) **Lab 3, Credits 3 (Fall or Spring)**

DDDD-305

3D Interactive Storytelling

This course focuses on developing and implementing digital narratives with two and three-dimensional computer graphics. Through short creative assignments and larger projects, students will have the opportunity to work with multimedia tools to create new forms of branching and circular narratives, as well as integrate interactivity to 3D environments. Students will create fiction narrative prototypes that explore the intersections of story, interface, networks, and games, in contemporary interactive media. Coursework will include reading, writing, design concepts, design documents and narrative prototype development. (Prerequisite: DDDD-101 or equivalent course.) **Lecture 2, Credits 3 (Fall or Spring)**

DDDD-355

Mini-Experimental Workshop

This course focuses on implementing areas of special interest including new, advanced and emerging 3D digital design course content. Potential topics include any area in 3D digital or game design. This course can be taken multiple times but individual topics must be different. **Studio 2, Credits 1 (Fall, Spring)**

DDDD-399

3D Digital Design Part-Time Co-op

Cooperative Education will provide 3D Digital Design students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in 3DDG-BFA with at least 2nd year standing and department permission.) **CO OP, Credits 0 (Fall, Spring, Summer)**

DDDD-400

Senior Capstone

The course focuses on the creation of the capstone project for the completion of the 3D Digital Design degree. This course will guide students through their individual three-dimensional digital design project from the planning stage, through completion and to presentation. Students will refine and complete their projects as well as prepare their capstone pieces for competitions. Completed projects will be presented in a senior capstone exhibition. (Prerequisites: DDDD-306 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

DDDD-401

Senior Capstone Test and Documentation

The course focuses on the development of a three-dimensional digital design project from the planning stage, primary and secondary research, through testing of technical ideas, completion and presentation of a design document, timeline, and budget. Students will develop project details in preparation for a final critique and for implementing the project in Senior Capstone I and II. (Prerequisites: DDDD-306 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

DDDD-402

Senior Capstone I

The course focuses on implementation of a three-dimensional digital design project from the planning stage, through completion and presentation. By the end of the term the student will have completed at least half of the project and have made all of the aesthetic decisions relative to the project in preparation for an intense critique at the end of the term. (Prerequisites: DDDD-306 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

DDDD-403

Senior Capstone II

The course focuses on the completion of a major three-dimensional digital design project from the planning stage, through completion and presentation. Based on the feedback received in the critique at the end of the previous sections of Senior Capstone I, students will refine and complete their project and prepare to submit their work to competitions and integrate it into their portfolio. Finished projects are presented in a Senior Capstone show. (Co-requisite: DDDD-402 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

DDDD-498

3D Digital Design Internship

This course exposes students to the professional environment through outside job opportunities in at places of employment that utilize three-dimensional software for various applications and other acceptable organizations. Students will work under the guidance of Art Directors, Technical Directors, or other professionals in the field and perform creative work that is educational and meaningful for their short-term academic goals as well as their long-range career preparation. Documentation of the experience is required and final review from employer is required documenting the kind and quality of work performed. Students must obtain pre-approval of their department and complete the Internship Approval Form. Credit earned is used toward elective or major elective credits. (Prerequisites: This class is restricted to students in 3DDG-BFA with at least 2nd year standing and department permission.) **Internship, Credits 1 - 6 (Fall, Spring)**

DDDD-499

3D Digital Design Co-op

Cooperative Education will provide 3D Digital Design students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in 3DDG-BFA with at least 2nd year standing and department permission.) **CO OP, Credits 0 (Fall, Spring, Summer)**

DDDD-516

Advanced Studio: Topic

This course will focus on working in a studio environment to explore or refine skills in an area of three-dimensional digital design. Students will work closely with the instructor to research and complete tutorials in a new area. They will develop skills in that area and then articulate what they have learned. An area of exploration will be defined by the topic for the course. Topics can not be re-taken. (Prerequisite: DDDD-306 or SOFA-226 or ILLM-506 or equivalent course.) **Lab 2, Credits 3 (Fall or Spring)**

DDDD-516

Advanced Studio: Topic

This course will focus on working in a studio environment to explore or refine skills in an area of three-dimensional digital design. Students will work closely with the instructor to research and complete tutorials in a new area. They will develop skills in that area and then articulate what they have learned. An area of exploration will be defined by the topic for the course. Topics can not be re-taken. (Prerequisite: DDDD-306 or SOFA-226 or ILLM-506 or equivalent course.) **Lecture 2, Credits 3 (Fall or Spring)**

DDDD-517

Experimental Workshop

The course focuses on implementing, advanced, newly developing ideas in three-dimensional computer graphics. The specific topic varies and is determined by the instructor. A specific course outline is provided each time the course is taught. Potential topics include the creation of interactive installations, game asset design, digital performances, cyber fashion, network art, locative media, scientific visualization, information visualization, event design, projection design, or any new area in digital design. This course has a subtopic and may be repeated with different subtopics; subtopics cannot be repeated. (Prerequisites: DDDD-206 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring)**

DDDD-517

Experimental Workshop

The course focuses on implementing, advanced, newly developing ideas in three-dimensional computer graphics. The specific topic varies and is determined by the instructor. A specific course outline is provided each time the course is taught. Potential topics include the creation of interactive installations, game asset design, digital performances, cyber fashion, network art, locative media, scientific visualization, information visualization, event design, projection design, or any new area in digital design. This course has a subtopic and may be repeated with different subtopics; subtopics cannot be repeated. (Prerequisites: DDDD-206 or equivalent course.) **Studio 2, Credits 3 (Fall, Spring)**

DDDD-521

Character Design and Rigging

This course will cover the design of characters and then the creation of them using three-dimensional software, inverse kinematics, parent and rigid binding, bones, and deformers. Students will design characters using techniques like interpretant matrices, model sheets, sketches, and maquettes followed by development of actual characters in software. Characters are designed for incorporation into motion graphics, games, real time applications, performance, or visualization. (Prerequisites: DDDD-201 and DDDD-203 or equivalent courses. Co-requisite: DDDD-208 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

DDDD-521

Character Design and Rigging

This course will cover the design of characters and then the creation of them using three-dimensional software, inverse kinematics, parent and rigid binding, bones, and deformers. Students will design characters using techniques like interpretant matrices, model sheets, sketches, and maquettes followed by development of actual characters in software. Characters are designed for incorporation into motion graphics, games, real time applications, performance, or visualization. (Prerequisites: DDDD-201 and DDDD-203 or equivalent courses. Co-requisite: DDDD-208 or equivalent course.) **Studio 2, Credits 3 (Fall)**

DDDD-522

Environment Design

This course covers modeling techniques useful in developing environments, both interior and exterior. The content of the course covers proportions appropriate to a variety of environments, lighting for spaces, surface design to replicate real world materials, and building to an appropriate level of detail for the circumstance. (Prerequisites: DDDD-201 and DDDD-207 or equivalent courses.) **Lecture 2, Credits 3 (Fall)**

DDDD-522**Environment Design**

This course covers modeling techniques useful in developing environments, both interior and exterior. The content of the course covers proportions appropriate to a variety of environments, lighting for spaces, surface design to replicate real world materials, and building to an appropriate level of detail for the circumstance. (Prerequisites: DDDD-201 and DDDD-207 or equivalent courses.) **Studio 2, Credits 3 (Fall)**

DDDD-523**Hard Surface Design**

The course focuses on designing and constructing hard surface models including machinery, furniture, vehicles, electronics, and robots. Students explore the use of different modeling techniques in the process and are particularly interested in the flow of the topology within the geometry. Some attention is given to creating controls for moving the hard surface models. (Prerequisite: DDDD-201 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

DDDD-523**Hard Surface Design**

The course focuses on designing and constructing hard surface models including machinery, furniture, vehicles, electronics, and robots. Students explore the use of different modeling techniques in the process and are particularly interested in the flow of the topology within the geometry. Some attention is given to creating controls for moving the hard surface models. (Prerequisite: DDDD-201 or equivalent course.) **Studio 2, Credits 3 (Fall)**

DDDD-526**Physical Interface Design**

This course covers the use of basic electronics so that students can develop embedded systems or controllers for games, design environments with ambient intelligence, design interactive museum exhibits and point of purchase installations, or embed electronics in clothing. Students use micro controllers, sensors, switches, lights, and motors to implement their designs. **Lecture 2, Credits 3 (Spring)**

DDDD-526**Physical Interface Design**

This course covers the use of basic electronics so that students can develop embedded systems or controllers for games, design environments with ambient intelligence, design interactive museum exhibits and point of purchase installations, or embed electronics in clothing. Students use micro controllers, sensors, switches, lights, and motors to implement their designs. **Studio 2, Credits 3 (Spring)**

DDDD-527**Real Time Design**

In this course students design levels for games or virtual worlds for a variety of applications. Once the design is complete, the design is implemented using high-end three-dimensional software. In many cases the projects will be large and will be executed by teams of students. Versioning systems will be used to keep track of the most recently developed assets. Models are imported into real time software engines for manipulation. (Prerequisite: DDDD-201 or equivalent course.) **Lecture 2, Credits 3 (Fall or Spring)**

DDDD-527**Real Time Design**

In this course students design levels for games or virtual worlds for a variety of applications. Once the design is complete, the design is implemented using high-end three-dimensional software. In many cases the projects will be large and will be executed by teams of students. Versioning systems will be used to keep track of the most recently developed assets. Models are imported into real time software engines for manipulation. (Prerequisite: DDDD-201 or equivalent course.) **Studio 3, Credits 3 (Fall or Spring)**

DDDD-528**Simulating Natural Phenomena**

Students will learn to simulate gasses, liquids and forces as well as develop complex organic systems in natural environments. Students will employ particle systems, physics engines, l-systems, and software designed especially for developing richly detailed natural environments. The content of the course encompasses both modeling natural environments and also phenomena in motion, such as windstorms, fire, cloth, hair, fur, and water. (Prerequisite: DDDD-201 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

DDDD-528**Simulating Natural Phenomena**

Students will learn to simulate gasses, liquids and forces as well as develop complex organic systems in natural environments. Students will employ particle systems, physics engines, l-systems, and software designed especially for developing richly detailed natural environments. The content of the course encompasses both modeling natural environments and also phenomena in motion, such as windstorms, fire, cloth, hair, fur, and water. (Prerequisite: DDDD-201 or equivalent course.) **Studio 2, Credits 3 (Spring)**

DDDD-599**3D Digital Design Independent Study**

3D Digital Design Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty advisor will propose a course of study. 3D Digital Design independent study students must obtain permission of an instructor and complete the Independent Study Permission Form to enroll. (Prerequisites: This class is restricted to students in 3DDG-BFA with at least 3rd year standing and department permission.) **Ind Study, Credits 1 - 6 (Fall, Spring)**

Graphic Design**GRDE-106****Graphic Design Studio I**

This course is an introduction to basic visual communications in the field of graphic design. Lectures will cover graphic design topics and information ranging from typographic terminology and design principles to methods of visual organization. Assignments will be undertaken in the studio where hands-on introduction to graphic design studio skills and practices will occur. Through formal studies and perceptual understanding, including aesthetics, graphic form and structure, concept development problems and visual organization, students will design solutions to visual communication problems. Assignments will explore aspects of graphic imagery, typography, hierarchy, and layout. Students will refine their computer skills through applications requiring digital formats. (This course is restricted to GRDE-BFA or PHIMAG-BFA PHVMEDIA Major students.) **Lab 5, Credits 3 (Spring, Summer)**

GRDE-107**Motion Design I**

This course will introduce the concepts, principles and techniques of motion design and animation. Topics covered are planning and organization methods in the form of storyboards, animatics, kinetics, animation principles, sequencing, composition, visual variables, and forms of narrative storytelling. Focus is on the integration of time and media, such as illustration, photography, video, audio, animation and type, to communicate a moving message. This course will emphasize design from a problem-solving point of view and explores the production-timeline. (This course is restricted to GRDE-BFA or VISMEDIA-BFA Major students.) **Lab 5, Credits 3 (Spring)**

GRDE-201**Typography I**

This course is an introduction to the fundamental principles of typography (the visual representation of language) to effectively convey information and ideas to specific audiences. Focus is on the communicative function and aesthetic nature of typographic problem-solving. Course content and lectures will cover typographic terminology, type anatomy, history of typography as well as type classification, type measurement, and issues of legibility and readability. Once students are introduced to the fundamentals of typography, they will include imagery as appropriate. Students will also refine their skills using relevant software. (Pre-requisites: GRDE-106 and (GRDE-107 or FDTN-141) or equivalent courses.) **Lab 3, Credits 3 (Fall or Spring)**

GRDE-201**Typography I**

This course is an introduction to the fundamental principles of typography (the visual representation of language) to effectively convey information and ideas to specific audiences. Focus is on the communicative function and aesthetic nature of typographic problem-solving. Course content and lectures will cover typographic terminology, type anatomy, history of typography as well as type classification, type measurement, and issues of legibility and readability. Once students are introduced to the fundamentals of typography, they will include imagery as appropriate. Students will also refine their skills using relevant software. (Pre-requisites: GRDE-106 and (GRDE-107 or FDTN-141) or equivalent courses.) **Studio 2, Credits 3 (Fall or Spring)**

GRDE-202**Graphic Design Studio II**

This course will focus on the analysis, creation and use of imagery for communication purposes, along with an introduction to symbol and icon design as it relates to branding. Processes and techniques for creating images are explored. Projects incorporate symbolism, concept development and integration of image and text. This course will build upon the principles and theories learned in Graphic Design Studio I with project solutions developed for print media, motion and digital use. (Pre-requisites: GRDE-106 and (GRDE-107 or FDTN-141) or equivalent courses.) **Lab 3, Credits 3 (Fall or Spring)**

GRDE-202**Graphic Design Studio II**

This course will focus on the analysis, creation and use of imagery for communication purposes, along with an introduction to symbol and icon design as it relates to branding. Processes and techniques for creating images are explored. Projects incorporate symbolism, concept development and integration of image and text. This course will build upon the principles and theories learned in Graphic Design Studio I with project solutions developed for print media, motion and digital use. (Pre-requisites: GRDE-106 and (GRDE-107 or FDTN-141) or equivalent courses.) **Studio 2, Credits 3 (Fall or Spring)**

GRDE-205**History of Graphic Design**

This course will focus on the development of graphic communication from prehistory through the present. This course will provide students with knowledge and understanding of the places, people, events; historical and cultural factors; and technological innovations that have influenced the practice of graphic design. Lectures are complemented by guest speakers, archive visits, videos, research projects, critical essay writing, and discussion. (Prerequisites: ARTH-136 or equivalent course and completion of First Year Writing (FYW) requirement.) **Lecture 3, Credits 3 (Fall, Spring)**

GRDE-206

Students will expand upon the principles of grid theory, text and display typography, sequence, page layout, and type and image integration as they relate to a range of design applications: posters, instructional materials, brochures, magazines, books, etc. Visual organization, message communication, and imaging and page layout software skills are integrated in the course. (Prerequisite: GRDE-201 or GRDE-202 or equivalent course.) **Lab 3, Credits 3 (Fall or Spring)**

Typography II

GRDE-206

Students will expand upon the principles of grid theory, text and display typography, sequence, page layout, and type and image integration as they relate to a range of design applications: posters, instructional materials, brochures, magazines, books, etc. Visual organization, message communication, and imaging and page layout software skills are integrated in the course. (Prerequisite: GRDE-201 or GRDE-202 or equivalent course.) **Studio 2, Credits 3 (Fall or Spring)**

Typography II

GRDE-207

This course provides an introduction to interactivity through the study of basic principles and methodologies involved in designing digital interfaces. Students will engage in projects where they will investigate, conceptualize and propose innovative interactive solutions to problems through a human-centered design approach. Students will create navigable interfaces and systems that allow audiences to achieve meaningful goals through compelling content, connecting people to people and people to information and environments. The course will also provide an introduction to building websites and developing interactive components using industry standard coding languages and software. (Prerequisite: GRDE-201 or GRDE-202 or equivalent course.) **Lab 5, Credits 3 (Spring)**

Interactive Design I

GRDE-213

This course provides students with the fundamental understanding of the key variables, systems and phases of production workflow. Emphasis will be placed on job planning, implementation strategies and decision-making processes for print and digital production workflow. Projects will allow students to optimize their work for specific production requirements as well as for workflow strategies for cross-media applications. (Prerequisites: GRDE-201 and GRDE-202 or equivalent courses.) **Lab 5, Credits 3 (Spring)**

Design Production

GRDE-217

This comprehensive course will expand student knowledge of motion principles and theories and allow students to hone their technical skills. The course will cover advanced principles of motion graphics and animated storytelling. Focus will be on complex motion and animation techniques and best workflow practices. Two-dimensional and three-dimensional elements will be incorporated in working with spatial and visual continuity. Emphasis will be on experimentation, interactive storytelling, and the ability to convey a message through motion. Advanced techniques such as graph editors, working in 3D space with camera and motion tracking, video, audio, rotoscoping, compositing, and rendering will be introduced. (Pre-requisites: GRDE-106 and (GRDE-107 or FDTN-141) or equivalent courses.) **Lab 5, Credits 3 (Spring)**

Motion Design II

GRDE-301

This course will explore information design. Problem-solving focuses on functional requirements, information transmission, accessibility, and design structure across a range of formats. Applied problems are solved through principles of systems thinking, structure, diagrammatic interpretation, and the visual display of information. This course will build upon the principles and theories learned in Graphic Design Studio II with project solutions developed for print media, motion and digital use. (Prerequisites: GRDE-206 and GRDE-207 and GRDE-217 or equivalent courses.) **Lab 3, Credits 3 (Fall)**

Graphic Design Studio III

GRDE-301

This course will explore information design. Problem-solving focuses on functional requirements, information transmission, accessibility, and design structure across a range of formats. Applied problems are solved through principles of systems thinking, structure, diagrammatic interpretation, and the visual display of information. This course will build upon the principles and theories learned in Graphic Design Studio II with project solutions developed for print media, motion and digital use. (Prerequisites: GRDE-206 and GRDE-207 and GRDE-217 or equivalent courses.) **Studio 2, Credits 3 (Fall)**

Graphic Design Studio III

GRDE-302

This course encompasses and expands on previous interactive design, development, and graphic design experience. In this class, the application of user-centered design methodologies will be emphasized in the planning and implementing of interactive, instructional projects across multiple devices and platforms. Thorough exploration of the user experience will be explored, and the resulting informed decisions on designing effective user interfaces. Students will engage in projects that incorporate contemporary social-cultural issues and will directly handle real content to define the underlying information architecture and structure of their interactive solutions. Design patterns, current, and future trends related to UI design will be discussed and applied according to industry's best practices. (Pre-requisites: GRDE-206 and GRDE-207 and GRDE-217 or equivalent courses. Co-requisite: GRDE-301 or equivalent course.) **Lab 5, Credits 3 (Fall)**

Interactive Design II

GRDE-306

In this course students will learn strategies to obtain internships and permanent employment in the graphic design profession. Emphasis will be placed on the various positions available to designers, the designer/client relationship, business aspects of design, and professional ethics and expectations. At the conclusion of this course students will be able to create promotional materials, including resume and portfolio design so that students can effectively and professionally present themselves in the field. (Prerequisites: GRDE-207 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

Professional Practices

GRDE-307

This course will provide students with conceptual, organizational, and aesthetic problem-solving methods to create unified and effective design systems, such as corporate identity systems, icon sets, poster and/or packaging series. Students will have an opportunity to synthesize graphic design principles from their previous courses into more advanced and in-depth projects. Research, concept generation, and relevant aesthetic principles will be emphasized. Presentation, writing, and professional skills will be a focus to prepare students for senior year coursework. Teamwork strategies and skills are implemented throughout the semester. (Prerequisites: GRDE-301 and GRDE-302 or equivalent courses.) **Lab 3, Credits 3 (Spring)**

Design Systems I

GRDE-307

This course will provide students with conceptual, organizational, and aesthetic problem-solving methods to create unified and effective design systems, such as corporate identity systems, icon sets, poster and/or packaging series. Students will have an opportunity to synthesize graphic design principles from their previous courses into more advanced and in-depth projects. Research, concept generation, and relevant aesthetic principles will be emphasized. Presentation, writing, and professional skills will be a focus to prepare students for senior year coursework. Teamwork strategies and skills are implemented throughout the semester. (Prerequisites: GRDE-301 and GRDE-302 or equivalent courses.) **Lecture 2, Credits 3 (Spring)**

Design Systems I

GRDE-308

This course will focus on design problem solving for three-dimensional spaces and environments. Design process, initial concepts, and final design solutions are developed to assist users in negotiating various interior and exterior environments. Areas of application may include: architectural graphics, signage systems, exhibit design, themed museum experiences, and dynamic environments. Two-dimensional, three-dimensional, and digital design attributes are incorporated using appropriate materials and software. (Prerequisites: GRDE-301 and GRDE-302 or equivalent courses.) **Lab 3, Credits 3 (Spring)**

Experiential Graphic Design

GRDE-308

This course will focus on design problem solving for three-dimensional spaces and environments. Design process, initial concepts, and final design solutions are developed to assist users in negotiating various interior and exterior environments. Areas of application may include: architectural graphics, signage systems, exhibit design, themed museum experiences, and dynamic environments. Two-dimensional, three-dimensional, and digital design attributes are incorporated using appropriate materials and software. (Prerequisites: GRDE-301 and GRDE-302 or equivalent courses.) **Studio 2, Credits 3 (Spring)**

Experiential Graphic Design

GRDE-322

This course will center on the contributions made by Modernist women designers. Emphasis will be placed on their unheralded pioneering efforts. Exemplars from the field will be presented, set in a historical context. Lectures are complemented by guest speakers, videos, participatory exercises, discussion, and critical essay writing. (This course is restricted to undergraduate students in CAD with at least 2nd year standing.) **Lecture 3, Credits 3 (Fall, Spring)**

Women Pioneers in Design

GRDE-326

This course is a thematic approach to the history of magazine design and provides a necessary historical basis for students in the visual arts and design. The course involves lectures on editorial designers, other pioneering Modernist designers, and design from other countries. Exemplars from the field are presented, set in a wide historical context. Lectures are complemented by guest speakers, videos, participatory exercises, discussion, and critical essay writing. (This course is restricted to undergraduate students in CAD with at least 2nd year standing.) **Lecture 3, Credits 3 (Fall, Spring)**

20th Century Editorial Design History

GRDE-399

Cooperative Education will provide Graphic Design students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in GRDE-BFA with at least 2nd year standing and department permission.) **CO OP, Credits 0 (Fall, Spring, Summer)**

Graphic Design Part-Time Co-op

GRDE-401**Collaborative Design**

This course offers students the opportunity and challenge of working on interdisciplinary and multidisciplinary teams to create professional level projects, which are collaborative, competitive and cooperative in structure and implementation. The content of the course will vary depending upon faculty expertise and coordination between departments, schools and colleges, as well as possible outside non-profit clients. (Prerequisites: GRDE-306 and GRDE-307 and GRDE-308 or equivalent courses.) **Lecture 2, Credits 3 (Fall, Spring)**

GRDE-401**Collaborative Design**

This course offers students the opportunity and challenge of working on interdisciplinary and multidisciplinary teams to create professional level projects, which are collaborative, competitive and cooperative in structure and implementation. The content of the course will vary depending upon faculty expertise and coordination between departments, schools and colleges, as well as possible outside non-profit clients. (Prerequisites: GRDE-306 and GRDE-307 and GRDE-308 or equivalent courses.) **Studio 3, Credits 3 (Fall, Spring)**

GRDE-411**Graphic Design Studio IV**

Students will acquire and practice the skills necessary to initiate and complete the research phase for a comprehensive project on a topic of each student's choosing. Students will identify a topic to research with the objective of bringing innovation or new knowledge to this area through this experience. Students will identify faculty and individuals to serve as expert consultants who will help guide the process and to evaluate the project in milestones throughout the semester. Students will write an abstract and submit this to the consultants for approval. Each milestone will be evaluated and graded. Emphasis will be on experimentation, exploration, and development of a wide range of ideas. (Prerequisites: GRDE-306 and GRDE-307 and GRDE-308 or equivalent courses. Co-requisite: GRDE-421 or equivalent course.) **Lab 3, Credits 3 (Fall)**

GRDE-411**Graphic Design Studio IV**

Students will acquire and practice the skills necessary to initiate and complete the research phase for a comprehensive project on a topic of each student's choosing. Students will identify a topic to research with the objective of bringing innovation or new knowledge to this area through this experience. Students will identify faculty and individuals to serve as expert consultants who will help guide the process and to evaluate the project in milestones throughout the semester. Students will write an abstract and submit this to the consultants for approval. Each milestone will be evaluated and graded. Emphasis will be on experimentation, exploration, and development of a wide range of ideas. (Prerequisites: GRDE-306 and GRDE-307 and GRDE-308 or equivalent courses. Co-requisite: GRDE-421 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

GRDE-412**Graphic Design Capstone**

In this course, students' working knowledge of graphic design will culminate in a comprehensive capstone project. The content of each capstone project will vary depending upon each student's focus/direction and approval from their instructor. The students will build on previous course work. Process and in-progress development is shared via class presentations and a final public exhibition for dissemination. A final formal presentation is required. (Prerequisites: GRDE-411 and GRDE-421 or equivalent courses.) **Studio 5, Credits 3 (Spring)**

GRDE-418**Editorial Design**

This course will explore the role of a graphic designer in developing effective and innovative communication for editorial design. Students will work on interdisciplinary teams (with photographers and/or illustrators) to create visual solutions for in-class projects and/or a magazine produced by the class. Design development processes and aspects of production methods will be implemented, and innovative techniques in digital publication design will be explored. (Prerequisites: GRDE-307 and GRDE-308 or equivalent courses.) **Studio 5, Credits 3 (Fall or Spring)**

GRDE-421**Design Systems II**

This course will provide an overview of branding and identity design. Processes, theories, design methods, brand strategies, positioning, touch-points, research, and management are introduced in creating comprehensive branding and identity systems. Case studies will provide students with historical context. Students will explore current and future trends related to branding. (Prerequisites: GRDE-306 and GRDE-307 and GRDE-308 or equivalent courses.) **Studio 5, Credits 3 (Fall)**

GRDE-422**Interactive Design III**

This course focuses on the application of advanced interactive methods using graphic design concepts, principles, and processes, along with the theories and methodologies of interactive design. Students will develop and refine skills in project planning, research, interface design and methods, UX/UI and usability through applied projects. Students will be encouraged to explore highly structured as well as highly experimental approaches to merging content with interactivity design while also incorporating social-cultural issues. (Prerequisites: GRDE-302 and GRDE-307 or equivalent courses.) **Lab 5, Credits 3 (Fall or Spring)**

GRDE-423**Typography III**

This course will provide students an advanced study of typography as it relates to graphic design, including historical and contemporary contexts. Terminology and advanced applications of typography, complex grid systems, experimental typographic methods, and material studies will be explored. The development of a personal creative approach to form and communication will be emphasized. (Prerequisites: GRDE-302 and GRDE-307 or equivalent courses.) **Studio 5, Credits 3 (Fall or Spring)**

GRDE-428**Advertising Design**

This course will explore the role of the graphic designer in developing communicative design for advertising. Emphasis will be placed on effective communication of the concept development and client's message. Advertising will be addressed in a broad context, and the course will include the relationship and use of typography, photographic imagery and layout for advertising impact. At times, this course will collaborate with an upper-level advertising photography class to better understand and experience the working relationship between the photographer and the designer. Some projects will be with outside clients, such as non-profit organizations or the Ad Council. (Prerequisites: GRDE-307 and GRDE-308 or equivalent courses.) **Studio 5, Credits 3 (Fall or Spring)**

GRDE-431**Packaging Systems Collaborative**

This course focuses on the design of physical packaging for the protection and marketing of goods. Aspects of visual, structural, ergonomic and environmental issues are considered in the design of rigid and flexible containers. Taught as a team/collaborative course, students from graphic design, packaging science, and industrial design will work together to develop effective packaging design solutions. (Prerequisites: GRDE-307 and GRDE-308 or equivalent courses.) **Studio 5, Credits 3 (Fall or Spring)**

GRDE-432**Packaging Systems Projects**

This course will focus on the design of physical packaging for the protection and marketing of goods. Aspects of visual, structural, ergonomic and environmental issues are considered in the design of rigid and flexible containers, in order to develop effective packaging design solutions. (Prerequisites: (GRDE-307 and GRDE-308) or IDDE-301 or equivalent courses.) **Studio 5, Credits 3 (Fall or Spring)**

GRDE-498**Graphic Design Internship**

This course exposes students to the professional environment through outside job opportunities in graphic design studios, advertising agencies, corporate communications departments, and other acceptable organizations. Students will work under the guidance of art directors, creative directors, senior graphic designers, or marketing communications managers and perform creative work that is educational and meaningful for their short-term academic goals as well as their long-range career preparation. Documentation of the experience is required and final review from employer is obtained. The appointed faculty adviser will meet with the student upon completion for final evaluation for a grade. Students must obtain pre-approval of their department and complete the Internship Approval Form. Credit earned is used toward elective credits. (Enrollment in this course requires permission from the department offering the course.) **Internship, Credits 1 - 6 (Fall, Spring)**

GRDE-499**Graphic Design Co-op**

Cooperative Education will provide Graphic Design students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in GRDE-BFA with at least 2nd year standing and department permission.) **CO OP, Credits 0 (Fall, Spring, Summer)**

GRDE-599**Graphic Design Independent Study**

Graphic Design Independent Study will provide students with the ability to focus in a specialized area of graphic design with an individual faculty member. Students, with the assistance of a faculty adviser, will propose a course of study. The independent study student must obtain permission of an instructor and department by completing the Independent Study Proposal Form to enroll. (Prerequisites: This class is restricted to students in GRDE-BFA with at least 3rd year standing and instructor permission.) **Ind Study, Credits 1 - 6**

Industrial Design

- IDDE-102** **Design Drawing**
This course will introduce students to drawing objects and three-dimensional space. Students will use the basics of perspective sketching, developing grids and mechanical perspective and orthogonal views. Students learn to depict various materials such as glass, metals, plastics, fabrics, wood, and other natural materials consistent with professional standards. (Prerequisites: FDTN-111 or equivalent course.) **Studio 6, Credits 3 (Spring)**
- IDDE-201** **Sophomore ID Studio I**
This course will focus on experimentation and discovery through the exploration of creative problem solving techniques. Students will explore the dynamics between objects and the user's senses, emotions, and expressed needs. Using drawing, sketch-modeling and basic shop skills, students will discover the wide choice of materials industrial designers use to further develop their projects. Concepts of recycling and reuse are introduced along with philosophical design approaches, and historical examples. Emphasis will be placed on the improvement of craft in the development of projects and on clarity and professionalism in practice. (Prerequisites: IDDE-102 or equivalent course.) **Studio 6, Credits 3 (Fall)**
- IDDE-202** **Sophomore ID Studio II**
In this course, design projects are conceived as the result of close contact between students and real-world projects commonly found in the manufacturing sector. Students research a specific manufacturing entity in order to understand its capabilities. Research will be conducted in the field and shared with the class to enhance the understanding of the realities associated with production. Students will be challenged to improve their ability to define problems, generate and promote concepts, evaluate their work and offer refinements of solutions. They will learn to derive inspiration from the material world and marketplace while simultaneously bringing inspiration to them. (Prerequisites: IDDE-201 or equivalent course.) **Studio 6, Credits 3 (Spring)**
- IDDE-206** **ID Form**
This course will emphasize the cognitive and technical skills necessary to manipulate material for the accurate three-dimensional communication of design intent. Projects focus on understanding the relationship of materials, manufacturing processes, products and the user. Special emphasis is placed on using non-toxic materials. (Prerequisites: FDTN-132 or FDTN-232 or equivalent course.) **Studio 6, Credits 3 (Fall)**
- IDDE-207** **ID Digital Drawing**
This course will develop more advanced analog and digital visualization techniques, while expanding on graphic and three-dimensional components needed to create presentations and the workflows to achieve them. Students will learn various types of digital techniques using vector and raster-based software applications, and a variety of input and output devices for the creation of professional-level output. (Prerequisites: IDDE-102 or equivalent course.) **Studio 6, Credits 3 (Fall)**
- IDDE-211** **Human Factors Applications**
This course will emphasize human characteristics, capabilities and limitations as the primary design criteria in understanding, designing and analyzing systems, displays, controls, tools, and workstations. (Prerequisites: IDDE-201 or equivalent course.) **Lecture 3, Credits 3 (Spring)**
- IDDE-212** **Integrated Computer-Aided Design**
Students will develop the skills needed to effectively develop and communicate design concepts graphically, digitally and three-dimensionally, consistent with professional industrial design practice standards. Emphasis will be placed on the development, integration and application of computer aided design skills throughout the assignments, utilizing the relationship of analog and digital mediums as a means of enriching the design process. (Prerequisites: IDDE-201 or equivalent course.) **Studio 6, Credits 3 (Spring)**
- IDDE-213** **History of Industrial Design**
This course explores the history of the industrial design profession as it evolved in response to the Industrial Revolution and industry's need for standardized approaches to aesthetics and design for the end user. Significant designers and their work are reviewed in the context of the economics and politics of the times. This course also surveys the history of modern furniture design from the late 19th Century to the present, including important design movements, individual designers and their significant furniture designs. **Lecture 3, Credits 3 (Fall)**
- IDDE-223** **History of Modern Furniture**
A study of Modern furniture and its most significant designers. Factors of style, materials, construction and ergonomics are examined in the context of time, place and purpose. **Lecture 3, Credits 3 (Fall)**
- IDDE-301** **Junior ID Studio I**
Students will explore the benefits and challenges of working with a design team to address a complex product, problem, or system. Students will explore group dynamics, creativity in design teams, as well as the nature of complex problems and the various methods required to solve them. (Prerequisites: IDDE-202 and IDDE-211 and IDDE-212 or equivalent courses.) **Studio 6, Credits 3 (Fall)**
- IDDE-302** **Junior ID Studio II**
This course will highlight the application of design methods and processes through projects that focus on deepening the students' problem-solving skills, studio skills (two- and three-dimensional sketching, drawing, CAD), shop skills (modelmaking) and presentation skills. Emphasis will be placed on collaborating with multidisciplinary partners outside the industrial design program, and/or, when circumstances allow, with external resources such as clients or project sponsors. (Prerequisites: IDDE-301 or equivalent course.) **Studio 6, Credits 3 (Spring)**
- IDDE-306** **Materials and Processes**
This course will help students develop a theoretical understanding and technical competency in materials and processes applied in industrial design practice. Discussions and assignments focus on the relationship of manufacturing processes and materials selection to design intent. (Prerequisites: IDDE-202 or equivalent course.) **Lecture 3, Credits 3 (Fall)**
- IDDE-307** **Graphic Tactics**
This course provides industrial design students with an introduction to the design and application of graphic elements to objects and environments. (Prerequisites: IDDE-202 or equivalent course.) **Studio 6, Credits 3 (Fall)**
- IDDE-311** **ID Career Planning**
This course will introduce the business of industrial design. Field trips, guest lecturers and discussion of current trends help students understand the various employment opportunities for the design professional. The course will cover the mechanics of job searching; creating a résumé, cover letter structure and portfolio, and interviewing to help prepare for design internships, co-ops, and entry-level positions. (Prerequisites: IDDE-301 or equivalent course and completion of First Year Writing (FYW) requirement.) **Lecture 3, Credits 3 (Spring)**
- IDDE-359** **Fabrication Techniques**
This course will provide students with an introduction to the application of various additive and subtractive fabrication methodologies, techniques and technologies. (Prerequisites: IDDE-212 or equivalent course.) **Studio 6, Credits 3 (Fall, Spring)**
- IDDE-399** **Industrial Design Part-Time Co-op**
Cooperative Education will provide Industrial Design students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in IDDE-BFA with at least 3rd year standing and department permission.) **CO OP, Credits 0 (Fall, Spring, Summer)**
- IDDE-406** **Professional Practice**
The course will take an in-depth look at business of design, and employment as a design professional for students beginning the job search. Students will refine their résumé, cover letter, and portfolio developed in Career Planning as they identify career options through research and networking with professionals in their chosen area. Students will explore the financial and legal aspects of employment in the design business. (Prerequisites: IDDE-302 or equivalent course.) **Lecture 3, Credits 3 (Fall)**
- IDDE-407** **ID Senior Capstone I**
This is the first course in a two-course sequence in which an industrial design capstone project is developed. Focus is on establishing content, planning, scheduling and research of a capstone project that explores the social elements of design either in a collaborative design process, or in the broader social impact of design decisions. Early stages of capstone development include ideation, concept refinement and evaluation. The capstone project is approved by the student's faculty advisor. (Prerequisites: IDDE-302 or equivalent course.) **Studio 6, Credits 3 (Fall)**
- IDDE-408** **ID Senior Capstone II**
This is the second course in a two-course sequence in which an industrial design capstone project is developed. Focus is on finalizing design solution, presenting it in a capstone show, and creating a written document that addresses how the theories and methods used in the project have an impact on the current and future state of design in society. The capstone project is approved by a faculty committee. (Prerequisites: IDDE-407 or equivalent course.) **Studio 6, Credits 3 (Spring)**

IDDE-498**Industrial Design Internship**

The industrial design internship provides students the option to work in the industrial design field. Students must obtain permission of an instructor and complete the Internship Permission Form to enroll. (Prerequisites: IDDE-202 or equivalent course.) **Internship, Credits 1 - 6 (Fall, Spring, Summer)**

IDDE-499**Industrial Design Co-op**

Cooperative Education will provide Industrial Design students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in IDDE-BFA with at least 3rd year standing and department permission.) **CO OP, Credits 0 (Fall, Spring, Summer)**

IDDE-501**Senior ID Studio I**

This course will explore the application of design methods and skills to projects addressing large-community and global problems requiring team-based, trans-disciplinary collaborations. (Prerequisites: IDDE-302 or equivalent course.) **Studio 5, Credits 3 (Fall or Spring)**

IDDE-502**Senior ID Studio II**

Senior ID Studio II applies design methods and skills to advanced level projects addressing users with unique, non-traditional needs requiring multi-disciplinary collaborations. Project development will emulate processes used in professional industrial design practice. (Prerequisites: IDDE-501 or equivalent course.) **Studio 6, Credits 3 (Spring)**

IDDE-520**The Studio 2.0**

This course will focus on developing ideas in art, design and craft. The specific topics for this course will vary each time it is taught. Potential topics may include the creation of public spaces, products, analog and digital fabrication, furniture, inter-disciplinary collaborations, etc. This course can be taken multiple times but individual topics must be different. (This class is restricted to students with majors in CAD and at least 3rd year student standing.) **Studio 6, Credits 3 (Fall or Spring)**

IDDE-561**CAD Applications**

This course will introduce advanced techniques for modeling, presenting, and communicating the "design intent" of a product concept. The specific topics for this course will vary each time it is taught. Potential topics will include new or upgraded software releases in relation to Industrial Design. Different topics within this course may be retaken for credit. The topic is determined by the instructor. The topic cannot be repeated. (Prerequisites: IDDE-207 or FDTN-111 or FDTN-121 or ITDI-211 or equivalent courses.) **Studio 6, Credits 3 (Fall, Spring)**

IDDE-569**Master Seminar**

The Master Seminar course is a forum for cross-disciplinary presentations and discussions of methods, techniques, processes, and interpretations. Luminaries discuss conceptual and practical studio activities, their current and past endeavors, and the contextualization of their work. Assignments may range from ideation exercises, charrettes, studio visits, research papers, and presentations. (Prerequisites: IDDE-102 or equivalence course and at least 3rd year standing in IDDE-BFA.) **Lecture 3, Credits 3 (Fall, Spring)**

IDDE-573**ID Sketching Studio**

A studio styled course in freehand sketching and visualization techniques using a combination of orthogonal, perspective, empathic and any other two-dimensional means of developing and communicating design concepts. (Prerequisites: IDDE-102 or INDE-202 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring)**

IDDE-573**ID Sketching Studio**

A studio styled course in freehand sketching and visualization techniques using a combination of orthogonal, perspective, empathic and any other two-dimensional means of developing and communicating design concepts. (Prerequisites: IDDE-102 or INDE-202 or equivalent course.) **Studio 3, Credits 3 (Fall, Spring)**

IDDE-599**Industrial Design Independent Study**

Industrial Design Independent Study provides students the means to study in a specialized area with an individual faculty member. With the assistance of their faculty advisers, students will propose a course of study. Students must obtain permission of an instructor and complete the Independent Study Permission Form to enroll. A 3.0 or higher GPA required. (Prerequisites: This class is restricted to students in IDDE-BFA with at least 3rd year standing and instructor permission.) **Ind Study, Credits 1 - 6 (Fall, Spring)**

Interior Design**INDE-101****Introduction to Interior Design I**

This is the first course of a two-part introduction to interior design. This course will acquaint students with the profession and history of interior design. Students will be introduced to design thinking and methods for exploring the ideation process including communication methods. Design problems will focus on volumetric and spatial explorations, including the relationship of the human body to the built environment and to material connections. (Prerequisites: FDTN-111 and FDTN-121 and FDTN-131 or equivalent course and enrollment in the INDE-BFA program.) **Studio 6, Credits 3 (Spring)**

INDE-102**Design Drawing I**

Fundamental concepts of architectural graphic communication conventions, ideation sketching and drafting skills are taught in this course. Skill development will be both manual and computer based and range from free-hand sketching and diagramming to formal three-dimensional computer modeling. Principles of orthographic projection, paraline drawings and perspective will be covered. (Prerequisites: FDTN-111 or equivalent course.Co-requisites: INDE-101 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

INDE-102**Design Drawing I**

Fundamental concepts of architectural graphic communication conventions, ideation sketching and drafting skills are taught in this course. Skill development will be both manual and computer based and range from free-hand sketching and diagramming to formal three-dimensional computer modeling. Principles of orthographic projection, paraline drawings and perspective will be covered. (Prerequisites: FDTN-111 or equivalent course.Co-requisites: INDE-101 or equivalent course.) **Studio 3, Credits 3 (Spring)**

INDE-201**Introduction to Interior Design II**

This course will build upon theories and methodologies of design process for creating spatial relationships in the interior environment. It will also introduce students to the fundamental concepts of sustainability and the accessibility requirements of the Americans for Disability Act (ADA). The course will provide students opportunities to apply design elements and principles in two and three-dimensional explorations. (Prerequisite: FDTN-132 or FDTN-232 and INDE-101 and INDE-102 or equivalent courses.) **Studio 6, Credits 3 (Fall)**

INDE-202**Design Drawing II**

Graphic communication skills are further developed utilizing computer aided drafting tools to represent complex geometric forms and spatial conditions for the architectural interior. Common drawing conventions of plans, sections, and elevations and perspective are emphasized. (Prerequisites: INDE-102 or equivalent course.) **Studio 6, Credits 3 (Fall)**

INDE-203**Digital Graphics**

This course will introduce students to and provide basic skills in digital graphics and publishing. Layout of print and web based documents will be augmented with design and typographic principles, image acquisition, and fundamentals of bitmap and vector graphics. (Prerequisites: FDTN-121 or equivalent course.Co-requisites: INDE-201 or equivalent course.) **Lab 3, Credits 3 (Fall, Spring)**

INDE-203**Digital Graphics**

This course will introduce students to and provide basic skills in digital graphics and publishing. Layout of print and web based documents will be augmented with design and typographic principles, image acquisition, and fundamentals of bitmap and vector graphics. (Prerequisites: FDTN-121 or equivalent course.Co-requisites: INDE-201 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring)**

INDE-207**Color and Lighting Theory**

The course will introduce students to color and lighting. Students will apply principles of light and color to projects. (Prerequisites: INDE-201 and INDE-202 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

INDE-207**Color and Lighting Theory**

The course will introduce students to color and lighting. Students will apply principles of light and color to projects. (Prerequisites: INDE-201 and INDE-202 or equivalent courses.) **Studio 2, Credits 3 (Spring)**

INDE-212**Hospitality Design**

The course will introduce students to the interior specialty of hospitality design. Students will understand the principles, elements, and material applications relevant to commercial interiors of the service industry. (Prerequisites: INDE-201 and INDE-202 or equivalent courses.) **Studio 6, Credits 3 (Spring)**

College of Art and Design

- INDE-222** **Design Issues**
The course will introduce students the principles and theories of interior design. Topics will include the elements and principles of design, accessibility, human factors, and sustainability. Students will be introduced to investigative processes for design including observational research, interviewing, literature reviews, reporting, and evidence based design. (Prerequisites: INDE-201 and INDE-202 or equivalent courses and completion of First Year Writing (FYW) requirement.) **Lecture 3, Credits 3 (Spring)**
- INDE-301** **Office Design**
The course will introduce students to office design and explore current trends in the contract industry. Students will engage in space planning for the commercial office interior and specify the systems and furnishings to outfit their proposals. (Prerequisite: INDE-212 or equivalent course.) **Studio 6, Credits 3 (Fall)**
- INDE-302** **Exhibition and Merchandising Design**
The course will introduce students to strategies for designing exhibition and merchandising environments such as retail stores, galleries and museums, visitor centers, pop up stores and temporary spaces, theater and photoshoots sets, and theme or event spaces. (Prerequisites: INDE-301 or equivalent course.) **Studio 6, Credits 3 (Spring)**
- INDE-303** **Materials and Specifications**
The course will introduce students to materials and specifications for interior design. Students will learn how to select and specify appropriate materials, finishes and furnishings based on performance, codes, testing, sustainability, indoor air quality, health and safety. (Prerequisites: INDE-201 or equivalent course and at least 3rd year standing in INDE-BFA.) **Studio 6, Credits 3 (Fall)**
- INDE-304** **Building Systems**
The course will introduce students to the components of building construction and environmental control systems. The building structure and envelope as the primary control system for function and human comfort. (Prerequisites: INDE-303 or equivalent course and at least 3rd year standing in INDE-BFA.) **Lecture 3, Credits 3 (Spring)**
- INDE-345** **History of Architecture, Interiors and Furniture I**
A survey of the history of western architecture, interiors, and furniture. An overview of the components of style, construction, and material as represented by architecture, interior environments and furnishings from the Ancient World to the Industrial Revolution. (Prerequisite: ARTH-135 and ARTH-136 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**
- INDE-346** **History of Architecture, Interiors and Furniture II**
A survey of the history of western architecture, interiors, and furniture. An overview of the components of style, construction, and material as represented by architecture, interior environments and furnishings from the Industrial Revolution to current day. (Prerequisite: ARTH-135 and ARTH-136 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**
- INDE-363** **Advanced Graphics Elective**
Advanced development of CAD or advanced modeling software skills to represent complex spatial concepts and three-dimensional modeling techniques for architectural and interior design communication. Advanced conceptualization drawing, graphic and rendering skills are introduced with 3D modeling and lighting techniques to emphasize spatial presentations. Introduce reality capture and 3D scanning of interior spaces for design exploration of as build conditions. (Prerequisite: INDE-202 or equivalent course.) **Studio 6, Credits 3 (Spring)**
- INDE-399** **Interior Design Part-Time Co-op**
Cooperative Education will provide Interior Design students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in INDE-BFA with at least 3rd year standing, a 2.5 cumulative GPA and department permission to enroll.) **CO OP, Credits 0 (Fall, Spring, Summer)**
- INDE-401** **Multi-Story/Multi-Purpose Design**
The course will introduce students to multi-story and multi-purpose design, building, zoning, proprietary and zoning codes, and ADA legislation. (Prerequisites: INDE-302 and INDE-303 and INDE-304 or equivalent courses.) **Studio 6, Credits 4 (Fall or Spring)**
- INDE-402** **Special Projects**
The course focuses on community service, social justice or theoretical projects that advanced design thinking for the global context. (Prerequisites: INDE-401 or equivalent course.) **Studio 6, Credits 3 (Fall or Spring)**
- INDE-403** **Health Care Design**
The course will introduce students to the specialization of health care design. Students will complete a comprehensive and complex design project based on a typical medical facility. (Prerequisites: INDE-401 or equivalent course.) **Studio 6, Credits 3 (Spring)**
- INDE-405** **Business Practices and Career Planning**
This course is an introduction to professional practice for interior designers. Topics emphasize business practices, project management, legal and ethical responsibilities. Students prepare for job search and employment. (This course is restricted to 4th year students in the INDE-BFA program.) **Lecture 3, Credits 3 (Spring)**
- INDE-407** **Contract Documents**
This course will introduce students to contract documents relevant to the interior design profession. Students will complete an architectural drawing set and develop an understanding of requirements to communicate design solutions. (Prerequisite: INDE-304 or equivalent course.) **Lecture 2, Credits 3 (Fall)**
- INDE-407** **Contract Documents**
This course will introduce students to contract documents relevant to the interior design profession. Students will complete an architectural drawing set and develop an understanding of requirements to communicate design solutions. (Prerequisite: INDE-304 or equivalent course.) **Studio 4, Credits 3 (Fall)**
- INDE-411** **Interior Design Capstone I**
This is the first of two courses designed to advance a student towards completion of their undergraduate capstone. This course will focus on human-centered design projects that advance design thinking for the global context. Students will work toward a meaningful and significant capstone in their relevant discipline. At the completion of this course, students will present work in progress at a milestone defense and submit a manuscript draft with a completed literature review and research agenda including a proposal for a creative agenda to be completed in Capstone II. (Prerequisites: INDE-302 or equivalent course. Co-requisites: INDE-401 and INDE-407 or equivalent courses.) **Studio 6, Credits 3 (Fall)**
- INDE-412** **Interior Design Capstone II**
The second of two courses designed to advance a student towards completion of their undergraduate capstone. Students will focus on human centered projects that advance design thinking in a global context. At the completion of this course, students will defend their capstone in an oral defense and submit required documentation of their year-long design project. (Prerequisite: INDE-411 or equivalent course.) **Studio 6, Credits 3 (Spring)**
- INDE-498** **Interior Design Internship**
The Interior Design Internship will provide students with the option to work in the interior design field. Students may apply for internships to businesses based on the availability of positions and business job needs. Students must obtain permission of an instructor and complete the Internship Permission Form to enroll. (Prerequisites: This class is restricted to students in INDE-BFA with at least 3rd year standing and department permission.) **Internship, Credits 1 - 6 (Fall, Spring, Summer)**
- INDE-499** **Interior Design Co-op**
Cooperative Education will provide Interior Design students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in INDE-BFA with at least 3rd year standing, a 2.5 cumulative GPA and department permission to enroll.) **CO OP, Credits 0 (Fall, Spring, Summer)**
- INDE-566** **Sustainable Building and Design Systems**
This course will introduce students to sustainable building and certification systems. Students will apply introductory knowledge of the environmental, financial and humankind benefits to a sustainable design. Content will assist students in preparing for sustainable certifications such as the LEED Green Associate examination. (This course is available to RIT degree-seeking undergraduate students.) **Lab 3, Credits 3 (Spring)**
- INDE-566** **Sustainable Building and Design Systems**
This course will introduce students to sustainable building and certification systems. Students will apply introductory knowledge of the environmental, financial and humankind benefits to a sustainable design. Content will assist students in preparing for sustainable certifications such as the LEED Green Associate examination. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 2, Credits 3 (Spring)**

INDE-599**Interior Design Independent Study**

Interior Design Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser, will propose a course of study. Independent study students must obtain permission of an instructor and complete the Independent Study Permission Form to enroll. (Prerequisites: This class is restricted to students in INDE-BFA with at least 3rd year standing, a 3.0 cumulative GPA and instructor permission to enroll.) **Ind Study, Credits 1 - 6 (Fall, Spring)**

New Media Design

NMDE-101**New Media Design Imaging**

This project-based course is an investigation of the computer as an illustrative and image generation tool. It develops design skills in raster and vector image creation, editing, and compositing for online production. Emphasis will be on the application of visual design organization methods to electronic media. Students will create and edit images, montages and raster-based design solutions for online delivery. Development and reinforcement of drawing skills in the digital environment will be explored and expanded, as well as pictorial composition and visual aesthetics. **Lab 3, Credits 3 (Fall)**

NMDE-101**New Media Design Imaging**

This project-based course is an investigation of the computer as an illustrative and image generation tool. It develops design skills in raster and vector image creation, editing, and compositing for online production. Emphasis will be on the application of visual design organization methods to electronic media. Students will create and edit images, montages and raster-based design solutions for online delivery. Development and reinforcement of drawing skills in the digital environment will be explored and expanded, as well as pictorial composition and visual aesthetics. **Lecture 2, Credits 3 (Fall)**

NMDE-103**New Media Design Interactive I**

This course provides an introduction to key internet, web and multimedia technologies. Topics covered include computer-based communication and information, basic HTML, Adobe Flash and WYSIWYG editors, basic internet applications such as FTP, basic use of digital images, audio and video techniques, web page design, web animation for development and publishing. (Prerequisites: NMDE-111 or equivalent course student standing in NMDE-BFA program.) **Lab 3, Credits 3 (Spring)**

NMDE-103**New Media Design Interactive I**

This course provides an introduction to key internet, web and multimedia technologies. Topics covered include computer-based communication and information, basic HTML, Adobe Flash and WYSIWYG editors, basic internet applications such as FTP, basic use of digital images, audio and video techniques, web page design, web animation for development and publishing. (Prerequisites: NMDE-111 or equivalent course student standing in NMDE-BFA program.) **Lecture 2, Credits 3 (Spring)**

NMDE-111**New Media Design Digital Survey I**

This project-based course is an investigation of the computer as an illustrative, imaging, and graphical generation tool. It develops foundational design skills in raster and vector image creation, editing, compositing, layout and visual design for online production. Emphasis will be on the application of visual design organization methods and principles for electronic media. Students will create and edit images, graphics, layouts and typography to form effective design solutions for online delivery. (This course is restricted to students in the WMC-BS or HCC-BS or NMDE-BFA or NWMEDID-BS or DIGHSS-BS program.) **Lab 3, Credits 3 (Fall, Spring)**

NMDE-111**New Media Design Digital Survey I**

This project-based course is an investigation of the computer as an illustrative, imaging, and graphical generation tool. It develops foundational design skills in raster and vector image creation, editing, compositing, layout and visual design for online production. Emphasis will be on the application of visual design organization methods and principles for electronic media. Students will create and edit images, graphics, layouts and typography to form effective design solutions for online delivery. (This course is restricted to students in the WMC-BS or HCC-BS or NMDE-BFA or NWMEDID-BS or DIGHSS-BS program.) **Lecture 2, Credits 3 (Fall, Spring)**

NMDE-112**New Media Design Digital Survey II**

Through formal studies and perceptual understanding, including aesthetics, graphic form, structure, concept development, visual organization methods and interaction principles, students will design graphical solutions to communication problems for static and interactive projects. Students will focus on creating appropriate and usable design systems through the successful application of design theory and best practices. Assignments exploring aspects of graphic imagery, typography, usability and production for multiple digital devices and formats will be included. (Prerequisite: NMDE-111 or NMAD-155 or equivalent course.) **Lab 3, Credits 3 (Fall, Spring)**

NMDE-112**New Media Design Digital Survey II**

Through formal studies and perceptual understanding, including aesthetics, graphic form, structure, concept development, visual organization methods and interaction principles, students will design graphical solutions to communication problems for static and interactive projects. Students will focus on creating appropriate and usable design systems through the successful application of design theory and best practices. Assignments exploring aspects of graphic imagery, typography, usability and production for multiple digital devices and formats will be included. (Prerequisite: NMDE-111 or NMAD-155 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring)**

NMDE-201**New Media Design Elements II**

Information design for static, dynamic and interactive multimedia integrates content with visual indicators. Legibility and clear communication of information and direction is important to the success of any user interface design. This course integrates imagery, type, icons, actions, color, visual hierarchy, and information architecture as a foundation to design successful interactive experiences. (Prerequisites: NMDE-102 or 112 or equivalent course and student standing in NMDE-BFA or HCC-BS or DIGHSS-BS program.) **Lab 3, Credits 3 (Fall)**

NMDE-201**New Media Design Elements II**

Information design for static, dynamic and interactive multimedia integrates content with visual indicators. Legibility and clear communication of information and direction is important to the success of any user interface design. This course integrates imagery, type, icons, actions, color, visual hierarchy, and information architecture as a foundation to design successful interactive experiences. (Prerequisites: NMDE-102 or 112 or equivalent course and student standing in NMDE-BFA or HCC-BS or DIGHSS-BS program.) **Lecture 2, Credits 3 (Fall)**

NMDE-202**New Media Design 3D**

A comprehensive course in visualization that extends previous experience and skills to include three-dimensional creation and design. The course will provide studies in 3D modeling, rendering and animation for use in virtual spaces, rich internet and mobile applications as well as motion graphic design. Digital 3D tools will be used for solving visual design and communication problems. Students will be expected to show evidence of growth in 3D asset creation and usage in the form of simple product renderings, interactive integration and story based animation. (This course is restricted to NMDE-BFA Major students.) **Lab 3, Credits 3 (Fall)**

NMDE-202**New Media Design 3D**

A comprehensive course in visualization that extends previous experience and skills to include three-dimensional creation and design. The course will provide studies in 3D modeling, rendering and animation for use in virtual spaces, rich internet and mobile applications as well as motion graphic design. Digital 3D tools will be used for solving visual design and communication problems. Students will be expected to show evidence of growth in 3D asset creation and usage in the form of simple product renderings, interactive integration and story based animation. (This course is restricted to NMDE-BFA Major students.) **Lecture 2, Credits 3 (Fall)**

NMDE-203**New Media Design Interactive II**

This course extends previous interactive design and development experience and skills to emphasize interactive design principles and development. The emphasis in this course will be on the creative process of planning and implementing an interactive project across multiple platforms. Students will concentrate on information architecture, interactive design, conceptual creation, digital assets, visual design and programming for interactions. (Prerequisites: NMDE-103 or ISTE-140 and NMDE-112 and NMDE-201 or equivalent courses.) **Lab 3, Credits 3 (Spring)**

NMDE-203**New Media Design Interactive II**

This course extends previous interactive design and development experience and skills to emphasize interactive design principles and development. The emphasis in this course will be on the creative process of planning and implementing an interactive project across multiple platforms. Students will concentrate on information architecture, interactive design, conceptual creation, digital assets, visual design and programming for interactions. (Prerequisites: NMDE-103 or ISTE-140 and NMDE-112 and NMDE-201 or equivalent courses.) **Lecture 2, Credits 3 (Spring)**

NMDE-204**New Media Design Animation**

This project-based course provides training and practical experience in producing two- and three-dimensional animated sequences using off the shelf multimedia software. Students produce a number of short exercises incorporating original computer and non-digital artwork. Topics include key frame and tweening, cycling, acceleration, squash and stretch, backgrounds, inking, rotoscoping, sound, masking, multi-plane effects and space-to-time. Screenings of professionally made films will illustrate and provide historical perspective. (Prerequisites: FDTN-141 and NMDE-202 or equivalent course.) **Lab 3, Credits 3 (Spring)**

College of Art and Design

NMDE-204

New Media Design Animation

This project-based course provides training and practical experience in producing two- and three-dimensional animated sequences using off the shelf multimedia software. Students produce a number of short exercises incorporating original computer and non-digital artwork. Topics include key frame and tweening, cycling, acceleration, squash and stretch, backgrounds, inking, rotoscoping, sound, masking, multi-plane effects and space-to-time. Screenings of professionally made films will illustrate and provide historical perspective. (Prerequisites: FDTN-141 and NMDE-202 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

NMDE-301

New Media Design Elements III

This course focuses on advanced visual communication within the current new media design profession. Through formal studies and perceptual understanding, including aesthetics, graphic form and structure, concept development and visual organization methods, students will design sophisticated solutions to communication problems. This course integrates imagery, typography, icons, user interface design, content creation and information architecture in order to design successful static, motion and interactive experiences. (Prerequisites: NMDE-201 and NMDE-302 or equivalent courses and completion of First Year Writing (FYW) requirement.) **Lab 3, Credits 3 (Spring)**

NMDE-301

New Media Design Elements III

This course focuses on advanced visual communication within the current new media design profession. Through formal studies and perceptual understanding, including aesthetics, graphic form and structure, concept development and visual organization methods, students will design sophisticated solutions to communication problems. This course integrates imagery, typography, icons, user interface design, content creation and information architecture in order to design successful static, motion and interactive experiences. (Prerequisites: NMDE-201 and NMDE-302 or equivalent courses and completion of First Year Writing (FYW) requirement.) **Lecture 2, Credits 3 (Spring)**

NMDE-302

New Media Design Graphical User Interface

This course examines the user-centered and iterative design approaches to application and interactive development with a focus on interface design, testing and development across multiple devices. Students will research and investigate human factors, visual metaphors and prototype development to create effective and cutting edge user interfaces. (Prerequisites: NMDE-201 and NMDE-203 or equivalent courses.) **Lab 3, Credits 3 (Fall)**

NMDE-302

New Media Design Graphical User Interface

This course examines the user-centered and iterative design approaches to application and interactive development with a focus on interface design, testing and development across multiple devices. Students will research and investigate human factors, visual metaphors and prototype development to create effective and cutting edge user interfaces. (Prerequisites: NMDE-201 and NMDE-203 or equivalent courses.) **Lecture 2, Credits 3 (Fall)**

NMDE-303

New Media Design Interactive III

A study of the application of information design theory and practice to the developing area of new media. Cartography and iconography will be viewed in the context of web and kiosk use. The delivery of consumer information, using interactive and dynamic media as the vehicle, will be investigated. (Prerequisites: NMDE-302 or equivalent course and student standing in NMDE-BFA program.) **Lab 3, Credits 3 (Spring)**

NMDE-303

New Media Design Interactive III

A study of the application of information design theory and practice to the developing area of new media. Cartography and iconography will be viewed in the context of web and kiosk use. The delivery of consumer information, using interactive and dynamic media as the vehicle, will be investigated. (Prerequisites: NMDE-302 or equivalent course and student standing in NMDE-BFA program.) **Lecture 2, Credits 3 (Spring)**

NMDE-305

New Media Design Motion Graphics

This course will deal with design concepts related to moving type. The impact of type as it moves, rotates, explodes, scales and fades will be considered. Legibility of the message will be studied in relation to delivery methods. Additional compositing, three-dimensional, camera tracking and special techniques and effects will be introduced during the class. (Prerequisites: NMDE-204 or equivalent course.) **Lab 3, Credits 3 (Fall)**

NMDE-305

New Media Design Motion Graphics

This course will deal with design concepts related to moving type. The impact of type as it moves, rotates, explodes, scales and fades will be considered. Legibility of the message will be studied in relation to delivery methods. Additional compositing, three-dimensional, camera tracking and special techniques and effects will be introduced during the class. (Prerequisites: NMDE-204 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

NMDE-375

New Media Design Digital Painting

Digital Painting is a project-based course that develops image generation and compositional skills, using raster software in combination with traditional media. This course expands on fundamental art and design principals in the digital arena, as well as building on the use of editing and image generation tools and creative skills. Students will generate and edit a variety of applicable subjects from humans to robots, cityscapes and natural environments, weather effects, montages through the use of data as a medium for visual solutions. Styles covered will vary from speed painting to a more traditional impressionistic style, setting up custom brushes and technical and time saving techniques. (Prerequisites: FDTN-111 or equivalent course.) **Lab 3, Credits 3 (Fall, Spring)**

NMDE-375

New Media Design Digital Painting

Digital Painting is a project-based course that develops image generation and compositional skills, using raster software in combination with traditional media. This course expands on fundamental art and design principals in the digital arena, as well as building on the use of editing and image generation tools and creative skills. Students will generate and edit a variety of applicable subjects from humans to robots, cityscapes and natural environments, weather effects, montages through the use of data as a medium for visual solutions. Styles covered will vary from speed painting to a more traditional impressionistic style, setting up custom brushes and technical and time saving techniques. (Prerequisites: FDTN-111 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring)**

NMDE-399

New Media Design Part-Time Co-op

Cooperative Education will provide New Media Design students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Enrollment in this course requires permission from the department offering the course.) **CO OP, Credits 0 (Fall, Spring, Summer)**

NMDE-401

New Media Design Capstone I

This course will focus on individual career preparation through topics such as resume development, job research, interviewing best practices, and creating or refining an online portfolio. Additional exploration and overviews will include the business aspects, practices, and workflows of the new media industry with a focus on designer/developer/client relationships. Students will integrate project workflows, management, team building, concept generation and prototyping through small team projects, and project research for NMD Capstone II. (NMDE-BFA 4YR or NWMEDID-BS 3+) **Lab 3, Credits 3 (Fall)**

NMDE-401

New Media Design Capstone I

This course will focus on individual career preparation through topics such as resume development, job research, interviewing best practices, and creating or refining an online portfolio. Additional exploration and overviews will include the business aspects, practices, and workflows of the new media industry with a focus on designer/developer/client relationships. Students will integrate project workflows, management, team building, concept generation and prototyping through small team projects, and project research for NMD Capstone II. (NMDE-BFA 4YR or NWMEDID-BS 3+) **Lecture 2, Credits 3 (Fall)**

NMDE-404

New Media Design Interactive IV

Students will create innovative interactive product promotions and installations. The projects created in the class will embrace new technology and will focus on innovative solutions for real world design problems. An emphasis will be placed on researching new technology and using it in conjunction with solid interactive design skills to create innovative projects. (Prerequisites: NMDE-303 or equivalent course.) **Lab 3, Credits 3 (Fall)**

NMDE-404

New Media Design Interactive IV

Students will create innovative interactive product promotions and installations. The projects created in the class will embrace new technology and will focus on innovative solutions for real world design problems. An emphasis will be placed on researching new technology and using it in conjunction with solid interactive design skills to create innovative projects. (Prerequisites: NMDE-303 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

NMDE-406

New Media Design Experimental

This project-based course affords the student the ability to apply an experimental approach to integrating digitally generated content with new media techniques and processes in new, imaginative ways. Students will be encouraged to approach the computer as a medium of creativity to explore issues of narrative, identity, place, and visual reality vs. digital reality. Students will exhibit completed projects in a virtual or public forum. This course is topic based and can be taken multiple times for credit. Specific topics can only be taken once. The topics will include advanced concepts in 3D, UX, digital art and interaction design. (Co-requisite: NMDE-404 or equivalent course.) **Lab 3, Credits 3 (Spring)**

NMDE-406**New Media Design Experimental**

This project-based course affords the student the ability to apply an experimental approach to integrating digitally generated content with new media techniques and processes in new, imaginative ways. Students will be encouraged to approach the computer as a medium of creativity to explore issues of narrative, identity, place, and visual reality vs. digital reality. Students will exhibit completed projects in a virtual or public forum. This course is topic based and can be taken multiple times for credit. Specific topics can only be taken once. The topics will include advanced concepts in 3D, UX, digital art and interaction design. (Co-requisite: NMDE-404 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

NMDE-411**New Media Design Capstone II**

This course will engage the New Media Design and related majors in a capstone production experience. The instructor will form collaborative student teams that will design, plan, prototype, and implement new media projects. Student teams will test their product with users and provide written feedback and analysis. Students will be evaluated on individual contributions and their team's final capstone project. (Prerequisites: NMDE-401 or equivalent course.) **Lab 3, Credits 3 (Fall, Spring)**

NMDE-411**New Media Design Capstone II**

This course will engage the New Media Design and related majors in a capstone production experience. The instructor will form collaborative student teams that will design, plan, prototype, and implement new media projects. Student teams will test their product with users and provide written feedback and analysis. Students will be evaluated on individual contributions and their team's final capstone project. (Prerequisites: NMDE-401 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring)**

NMDE-498**New Media Design Internship**

The New Media Design Internship will provide students with the option to work in the new media or visual communications field. Students may apply for internships to businesses based on the availability of positions and business job needs. Students must obtain permission of an instructor and complete the Internship Permission Form to enroll. (Prerequisites: This class is restricted to students in NMDE-BFA with at least 2nd year standing and department permission.) **Internship, Credits 1 - 3 (Fall, Spring, Summer)**

NMDE-499**New Media Design Co-op**

Cooperative Education will provide New Media Design students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in NMDE-BFA with at least 2nd year standing and department permission.) **CO OP, Credits 0 (Fall, Spring, Summer)**

NMDE-599**New Media Design Independent Study**

New Media Design Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser, will propose a course of study. New Media Design Independent Study students must obtain permission of an instructor and complete the Independent Study Permission Form to enroll. (Prerequisites: This class is restricted to students in NMDE-BFA with at least 2nd year standing and instructor permission.) **Ind Study, Credits 1 - 6 (Fall, Spring, Summer)**

School of Film and Animation

Film and Animation/Motion Picture Science

SOFA-011**SOFA D Film**

This course provides students an additional seven weeks to complete their unfinished workshop films. In this time, students will complete the film already in progress from their previous workshop class, and will screen it in the semester of its completion. (This class is restricted to 1st, 2nd and 3rd year students in FILMAN-BFA.) **Lecture, Credits 0 (Spring)**

SOFA-101**Production**

A fundamental course in non-synchronous film production and an introduction to digital video editing. Filmmaking is presented as a means of interpretation and expression. This course combines technical information in motion picture exposure and editing with a theoretical and practical approach to motion picture continuity. Production is in non-sync format and post-production is digital software. Students furnish film, tape and processing. **Fee: There is a lab free required for this course. ** (This class is restricted to 1st and 2nd year students in FILMAN-BFA or DIGCIME-BS.) **Lecture 2, Credits 3 (Fall or Spring)**

SOFA-101**Production**

A fundamental course in non-synchronous film production and an introduction to digital video editing. Filmmaking is presented as a means of interpretation and expression. This course combines technical information in motion picture exposure and editing with a theoretical and practical approach to motion picture continuity. Production is in non-sync format and post-production is digital software. Students furnish film, tape and processing. **Fee: There is a lab free required for this course. ** (This class is restricted to 1st and 2nd year students in FILMAN-BFA or DIGCIME-BS.) **Studio 3, Credits 3 (Fall or Spring)**

SOFA-102**Production II**

This is the second sequenced production course for freshmen film/video students pursuing a concentration of live action production. Emphasis is on a variety of approaches to the edited image. In addition to continuing to develop basic concepts of creating articulate film language in short productions, this course introduces the nature and importance of the sound component in creating cinematic works and focuses on digital workflow. An essential course for students in the film/video curriculum who must be able to create not only images but also mature and appropriate soundtracks for their film and video works. (Prerequisite: SOFA-101 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

SOFA-102**Production II**

This is the second sequenced production course for freshmen film/video students pursuing a concentration of live action production. Emphasis is on a variety of approaches to the edited image. In addition to continuing to develop basic concepts of creating articulate film language in short productions, this course introduces the nature and importance of the sound component in creating cinematic works and focuses on digital workflow. An essential course for students in the film/video curriculum who must be able to create not only images but also mature and appropriate soundtracks for their film and video works. (Prerequisite: SOFA-101 or equivalent course.) **Studio 3, Credits 3 (Spring)**

SOFA-103**Introduction to Imaging and Video Systems**

This course provides an introductory overview of the basic engineering and scientific principles associated with imaging systems. Topics covered include imaging physics, photographic science, human vision and perception, image capture and display technologies (both analog and digital), and digital image processing. This course is taught using both mathematical and phenomenological presentation and prepares students to proceed with more in-depth investigation of these fields in subsequent imaging science and motion picture science courses. Accompanying laboratory exercises provide hands-on experience with the presented concepts. (Co-requisite: MATH-171 or MATH-181 or MATH-181A or equivalent course.) **Lab 3, Credits 3 (Fall)**

SOFA-103**Introduction to Imaging and Video Systems**

This course provides an introductory overview of the basic engineering and scientific principles associated with imaging systems. Topics covered include imaging physics, photographic science, human vision and perception, image capture and display technologies (both analog and digital), and digital image processing. This course is taught using both mathematical and phenomenological presentation and prepares students to proceed with more in-depth investigation of these fields in subsequent imaging science and motion picture science courses. Accompanying laboratory exercises provide hands-on experience with the presented concepts. (Co-requisite: MATH-171 or MATH-181 or MATH-181A or equivalent course.) **Lecture 2, Credits 3 (Fall)**

SOFA-105**Documentary Field Practices**

This foundation level course introduces students to documentary film as a creative and socially engaging form of storytelling. In addition to aesthetic and conceptual skills, production techniques focus on the ability to develop filming strategies, gathering clean sound, filming to edit, and interviewing skills. In addition, the relationship between filmmaker and subject, will be examined, including the ethical challenges of representing real life subjects. Critical thinking skills will be employed as we analyze the different styles of documentary film. Students will work in small documentary crews out in the field learning the use of microphones, field lighting, handheld and other non-traditional camerawork, selecting/interviewing documentary subjects and capturing material with proper coverage in order to build scenes in the edit room. (Prerequisite: SOFA-101 or equivalent course.) **Lab 3, Credits 4 (Fall, Summer)**

SOFA-105**Documentary Field Practices**

This foundation level course introduces students to documentary film as a creative and socially engaging form of storytelling. In addition to aesthetic and conceptual skills, production techniques focus on the ability to develop filming strategies, gathering clean sound, filming to edit, and interviewing skills. In addition, the relationship between filmmaker and subject, will be examined, including the ethical challenges of representing real life subjects. Critical thinking skills will be employed as we analyze the different styles of documentary film. Students will work in small documentary crews out in the field learning the use of microphones, field lighting, handheld and other non-traditional camerawork, selecting/interviewing documentary subjects and capturing material with proper coverage in order to build scenes in the edit room. (Prerequisite: SOFA-101 or equivalent course.) **Lecture 3, Credits 4 (Fall, Summer)**

SOFA-107 **Principles of Animation**
This course will introduce the concepts and mechanics of movement for animation, focusing on, but not limited to, character based movement. Animation principles will be introduced and applied using hand-drawn methods, which will serve as the foundation for their application in any desired medium. Weekly exercises will be recorded using standard animation software, and will be reviewed, discussed and open to group critique. (Prerequisite: SOFA-121 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

SOFA-108 **Drawing for Animation**
This course focuses on the mechanics of motion as applied to animated characters, both human and non-human. Working directly from a live model, costumed and nude, and also employing visualization techniques, students will apply figure-drawing skills along with gesture drawing, focusing on the correct representation of weight, energy and force in sequential poses. Specific attention is paid to improving drawing skills in order to create stronger storytelling poses for animated properties. A variety of drawn animation examples will be screened in class. (Prerequisite: SOFA-121 or equivalent course. Co-requisite: SOFA-107 or equivalent course.) **Studio 6, Credits 3 (Spring)**

SOFA-112 **Fundamentals of Screenwriting**
This course will introduce students to the forms and techniques of writing for visual media, particularly the short film. Students will develop resources for finding stories and concepts that can be turned into films. Students will be responsible for writing a short script of their own choosing and for completing several brief written exercises in areas such as personal storytelling, character development, dialogue, and plot. Scripts written in this course can be used as the basis for films produced in other classes. (This class is restricted to 1st and 2nd year students in FILMAN-BFA or DIGCIME-BS.) **Lecture 3, Credits 3 (Spring)**

SOFA-113 **SOFA Survey: Hybrid Film and Animation**
Students will explore the artistic possibilities of mixing live action and animation in narrative, documentary and experimental filmmaking. The course is co-taught by animation and live-action professors, and similarly, live-action and animation students will collaborate on a series of very short projects. Through weekly screenings, lectures, discussions and projects, the strategies of creating a hybrid film practice will be examined and explored. **Lab 2, Credits 3 (Fall or Spring)**

SOFA-113 **SOFA Survey: Hybrid Film and Animation**
Students will explore the artistic possibilities of mixing live action and animation in narrative, documentary and experimental filmmaking. The course is co-taught by animation and live-action professors, and similarly, live-action and animation students will collaborate on a series of very short projects. Through weekly screenings, lectures, discussions and projects, the strategies of creating a hybrid film practice will be examined and explored. **Lecture 2, Credits 3 (Fall or Spring)**

SOFA-121 **Animation I**
This class will introduce students to the gamut of animation thinking and making through classroom instruction and hands-on practical experience. Lecture and readings will emphasize the process, theory and practice of animated filmmaking with extensive film screenings to illustrate each technique and related aesthetics. Hands-on supervised studio sessions will guide students to an intuitive understanding of the process of producing animation and students will use this understanding to analyze various animated works. Each student will develop their personal vision through assigned projects utilizing the material discussed in class. **This course has a facilities fee for Non-SOFA students.** **Lab 3, Credits 3 (Fall, Spring)**

SOFA-121 **Animation I**
This class will introduce students to the gamut of animation thinking and making through classroom instruction and hands-on practical experience. Lecture and readings will emphasize the process, theory and practice of animated filmmaking with extensive film screenings to illustrate each technique and related aesthetics. Hands-on supervised studio sessions will guide students to an intuitive understanding of the process of producing animation and students will use this understanding to analyze various animated works. Each student will develop their personal vision through assigned projects utilizing the material discussed in class. **This course has a facilities fee for Non-SOFA students.** **Lecture 2, Credits 3 (Fall, Spring)**

SOFA-122 **Fundamentals of Computers and Imaging Technology**
This course provides an introductory overview to computer systems and to principles associated with motion picture technologies. Topics covered include computer history, basics in computer architecture basics, operating systems, HTML and networking. Human vision and perception, image capture and display technologies (both analog and digital), digital image processing and post-production equipment and software are also covered. The course focuses on exposing the students to basic principles necessary to proceed with subsequent courses with production or animation focus. (This class is restricted to 1st and 2nd year students in FILMAN-BFA.) **Lab 3, Credits 3 (Fall, Spring)**

SOFA-122 **Fundamentals of Computers and Imaging Technology**
This course provides an introductory overview to computer systems and to principles associated with motion picture technologies. Topics covered include computer history, basics in computer architecture basics, operating systems, HTML and networking. Human vision and perception, image capture and display technologies (both analog and digital), digital image processing and post-production equipment and software are also covered. The course focuses on exposing the students to basic principles necessary to proceed with subsequent courses with production or animation focus. (This class is restricted to 1st and 2nd year students in FILMAN-BFA.) **Lecture 2, Credits 3 (Fall, Spring)**

SOFA-127 **Digital Filmmaking**
Digital video is currently used in many fields. This course teaches basic digital filmmaking skills (camera, editing, and sound) with an emphasis on storytelling skills using motion media. Students will work in small groups shooting and editing various projects in fiction, documentary, and experimental genres. **This course has a facilities fee for Non-SOFA students.** (This course is available to RIT degree-seeking undergraduate students.) **Lab 3, Credits 3 (Fall, Spring)**

SOFA-127 **Digital Filmmaking**
Digital video is currently used in many fields. This course teaches basic digital filmmaking skills (camera, editing, and sound) with an emphasis on storytelling skills using motion media. Students will work in small groups shooting and editing various projects in fiction, documentary, and experimental genres. **This course has a facilities fee for Non-SOFA students.** (This course is available to RIT degree-seeking undergraduate students.) **Lecture 2, Credits 3 (Fall, Spring)**

SOFA-131 **Film History and Theory I**
Film History and Theory I is a motion picture examination and readings course. It will give media production students the opportunity to trace the development of many of the techniques and forms in what now constitute traditional and expanded definitions of cinema. The course is taught from the perspective of a practicing filmmaker involved in the critical exploration of film language as well as its historical and cultural dimensions. In addition to lectures, the course includes weekly screenings of seminal works from the history of cinema. Screenings support class lectures. (This class is restricted to 1st and 2nd year students in FILMAN-BFA or DIGCIME-BS.) **Lec/Lab 5, Credits 3 (Fall)**

SOFA-165 **Audio Intro for Media**
Determine successful ways to capture audio and distribute for a variety of media formats. Develop listening and technical skills to manipulate audio for acceptable subjective qualities and meet technical standards. Each student will manipulate different forms of audio and summarize the decisions to accomplish final project. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 3, Credits 3 (Summer)**

SOFA-203 **2D Animation I**
This course focuses specifically on the sequential stages of hand-drawn digital animation. Students will explore every stage of production of a short animated scene, including dialogue, from ideation to clean up. Each week builds on the previous week's progress. The final result is a complete rough-animated scene. (Prerequisites: SOFA-107 and SOFA-108 or equivalent courses.) **Studio 6, Credits 3 (Fall)**

SOFA-205 **Basic Sound Recording**
Students will learn to work with sound and to distinguish and evaluate proper sound techniques for film and animation productions. The course lays the foundation for professional work in the sound industry. Each student records audio and prepares a mixed soundtrack to professional quality standards. (Prerequisite: SOFA-101 or equivalent course.) **Lab 2, Credits 3 (Fall, Spring)**

SOFA-205 **Basic Sound Recording**
Students will learn to work with sound and to distinguish and evaluate proper sound techniques for film and animation productions. The course lays the foundation for professional work in the sound industry. Each student records audio and prepares a mixed soundtrack to professional quality standards. (Prerequisite: SOFA-101 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

SOFA-206 **Directing**
This course is an introduction to the arts of directing and acting with an emphasis on script analysis, performance, and blocking. Students direct and act in scenes from professional productions. Scenes are rehearsed outside of class, and then staged and critiqued in class. (Prerequisites: SOFA-102 or SOFA-101 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

SOFA-208**Dramatic Structure**

This course explores the theories of dramatic structure from Aristotle to the present and applies these theories to current and classic dramatic works. The class also explores dramatic script structure as it is used in dramatic works on stage and screen. (Prerequisites: SOFA-112 and (SOFA-131 or SOFA-106) or equivalent courses and completion of First Year Writing (FYW) requirement.) **Lab 3, Credits 3 (Fall)**

SOFA-208**Dramatic Structure**

This course explores the theories of dramatic structure from Aristotle to the present and applies these theories to current and classic dramatic works. The class also explores dramatic script structure as it is used in dramatic works on stage and screen. (Prerequisites: SOFA-112 and (SOFA-131 or SOFA-106) or equivalent courses and completion of First Year Writing (FYW) requirement.) **Lecture 2, Credits 3 (Fall)**

SOFA-209**Introduction to 3D Modeling**

Students create models for animation in three-dimensional software. Students learn various modeling, texturing, and lighting techniques that apply to animation and digital cinematography. Students' model, texture and light three-dimensional environments. (Prerequisites: SOFA-107 or equivalent course or student standing in DIGCIME-BS.) **Lab 3, Credits 3 (Spring)**

SOFA-209**Introduction to 3D Modeling**

Students create models for animation in three-dimensional software. Students learn various modeling, texturing, and lighting techniques that apply to animation and digital cinematography. Students' model, texture and light three-dimensional environments. (Prerequisites: SOFA-107 or equivalent course or student standing in DIGCIME-BS.) **Lecture 2, Credits 3 (Spring)**

SOFA-211**Documentary Workshop**

Students will make a short documentary film on a subject they choose. Students plan for pre-production including research, contacting possible subjects, and writing a proposal. During the production phase of the film, students will learn interviewing skills, how to direct a documentary crew, and how to work with their subjects. During post production students will learn how to organize their material into a short film. Students will complete projects for screening at the end of the semester. (Prerequisites: SOFA-105 or SOFA-502 or PHPJ-315 or FDTN-141 or equivalent course.) **Lecture 4, Credits 4 (Fall or Spring)**

SOFA-212**Fiction Workshop**

Students will direct short fiction projects using either film or digital media and also serve on the production crew for other projects. Students specializing in a cinematic craft will work in important creative capacities on two or more projects. Students are encouraged to explore individual styles and concepts. Intensive pre-production protocol and documentation are followed. Editing and sound design will be completed as well. Students will complete projects for screening at the end of the semester. Students can retake this course as a SOFA elective once they have completed Documentary or Radical Cinema Workshop. (Prerequisite: SOFA-202 or equivalent course.) **Lecture 4, Credits 4 (Fall, Spring)**

SOFA-213**Radical Cinema Workshop**

Students will produce at least one major artistic work that uses the moving image. This course demands the use of alternative expressions in concept, style, or technology, and students are encouraged to take risks, break "rules" and explore their own unique creative potential. Students may work in a variety of media, depending on their proficiencies and their vision of the project. Students will complete projects for screening at the end of the semester. Students can retake this course as a SOFA elective once they have completed Fiction Workshop or Documentary Workshop. (Prerequisites: SOFA-105 or SOFA-202 or equivalent course.) **Lecture 4, Credits 4 (Fall, Spring)**

SOFA-215**3D Animation I**

This course is an introduction to three-dimensional computer animation and character rigging. The basic principles of animation will be addressed in relation to three-dimensional animation. Character rigging techniques are presented and will include skeletons and animation controls. Students produce a series of short 3D computer animations and some basic character rigs. Students will become familiar with a variety of 3D computer animation techniques. (Prerequisite: SOFA-107 or equivalent course.) **Lab 3, Credits 3 (Fall)**

SOFA-215**3D Animation I**

This course is an introduction to three-dimensional computer animation and character rigging. The basic principles of animation will be addressed in relation to three-dimensional animation. Character rigging techniques are presented and will include skeletons and animation controls. Students produce a series of short 3D computer animations and some basic character rigs. Students will become familiar with a variety of 3D computer animation techniques. (Prerequisite: SOFA-107 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

SOFA-216**3D Animation II**

In this course students will learn the mechanics of motion within characters. Complete character-rigging techniques will be discussed and demonstrated. Students will gain further knowledge of a variety of three-dimensional computer animation techniques and will produce a series of short 3D computer animations using a pre-rigged character. (Prerequisite: SOFA-215 or equivalent course.) **Lab 3, Credits 3 (Spring)**

SOFA-216**3D Animation II**

In this course students will learn the mechanics of motion within characters. Complete character-rigging techniques will be discussed and demonstrated. Students will gain further knowledge of a variety of three-dimensional computer animation techniques and will produce a series of short 3D computer animations using a pre-rigged character. (Prerequisite: SOFA-215 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

SOFA-217**Animation Production Workshop I**

This course will provide the first practical experience of building a complete animated film from conception to finish. Students will apply their knowledge within the greater context of an animation production pipeline. Weekly workshops are focused on helping students plan, develop, and execute their work with regular milestones and deadlines. Students will practice time-management and build skills to adhere to deadlines, and will present their completed films to the RIT community. (Prerequisites: (SOFA-203 or SOFA-215 or SOFA-522) and SOFA-228 or equivalent courses.) **Lec/Lab 4, Credits 4 (Spring)**

SOFA-218**Concept and Character Design**

This course will introduce students to the basics of design as applied to characters and environments for animated productions. Students will create and develop a cast of characters for an imagined property, focusing on group dynamics, visual appeal and personality development. Line, color, texture, shape, form and story are referenced when developing characters and environments. Students will institute a process of visual development through a variety of exercises, working toward a final, finished project. (Prerequisite: SOFA-203 or equivalent course.) **Lab 3, Credits 3 (Spring)**

SOFA-218**Concept and Character Design**

This course will introduce students to the basics of design as applied to characters and environments for animated productions. Students will create and develop a cast of characters for an imagined property, focusing on group dynamics, visual appeal and personality development. Line, color, texture, shape, form and story are referenced when developing characters and environments. Students will institute a process of visual development through a variety of exercises, working toward a final, finished project. (Prerequisite: SOFA-203 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

SOFA-221**After Effects for Animators**

This course will teach students the basics of Adobe After Effects. Students will learn production theory as well as gain practical experience in 2.5 D animation production. (Prerequisite: SOFA-107 or equivalent course.) **Lab 3, Credits 3 (Fall)**

SOFA-221**After Effects for Animators**

This course will teach students the basics of Adobe After Effects. Students will learn production theory as well as gain practical experience in 2.5 D animation production. (Prerequisite: SOFA-107 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

SOFA-224**2D Digital Animation**

This course will introduce students to two-dimensional computer animation, adapting traditional techniques to the digital production environment. Students will learn how to use specialized 2D animation software to produce short exercises adapted from traditional animation techniques. Students should be able to apply 2D digital animation tools into their own work. (Prerequisite: SOFA-107 or equivalent course.) **Lab 3, Credits 3 (Fall)**

SOFA-224**2D Digital Animation**

This course will introduce students to two-dimensional computer animation, adapting traditional techniques to the digital production environment. Students will learn how to use specialized 2D animation software to produce short exercises adapted from traditional animation techniques. Students should be able to apply 2D digital animation tools into their own work. (Prerequisite: SOFA-107 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

SOFA-225**Performance Resources for Animation**

In this course students will examine facial expressions and learn how to create emotion in the face. Advanced rigging techniques, especially pertaining to the faces, will be presented. Students will be presented with techniques to dissect sentences and reconstruct them in to useable connected speech for animated characters. Students will produce a series of short three-dimensional computer animations using a pre-rigged character. (Prerequisite: SOFA-107 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

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- SOFA-226** **Advanced 3D Modeling**
This course will focus on three-dimensional character modeling. Students will learn about anatomy and creating economical topology for deformation in animation and be introduced to industry-standard digital sculpting techniques. (Prerequisites: SOFA-209 or equivalent course.) **Lab 3, Credits 3 (Fall)**
- SOFA-226** **Advanced 3D Modeling**
This course will focus on three-dimensional character modeling. Students will learn about anatomy and creating economical topology for deformation in animation and be introduced to industry-standard digital sculpting techniques. (Prerequisites: SOFA-209 or equivalent course.) **Lecture 2, Credits 3 (Fall)**
- SOFA-227** **Animation Pre-Production**
This course will cover the planning process of an animated film from idea generation to the creation of a complete pre-production workbook and animatic. Students will also cover time management and production pipelines. Students will collect and produce short film ideas and learn to express them in a variety of methods. (Prerequisite: SOFA-121 or equivalent course.) **Lecture 3, Credits 3 (Spring)**
- SOFA-228** **Animation Scriptwriting and Storyboard**
This course concentrates on the structures of temporal organization for the screen in all animated productions. Particular attention is paid to the structures of scriptwriting and the layout of movements and visual composition via editing into storyboards. Various individual written script projects will be required of the student, leading to a final production script for an animated film that will be fully storyboarded and formatted. Particular attention will be paid to the visual storytelling aspects of converting a written script. Layouts from the production will also be developed. (Prerequisites: FDTN-121 or FDTN-131 or equivalent courses and completion of First Year Writing (FYW) requirement. Co-requisites: SOFA-203 or SOFA-215 or SOFA-522 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**
- SOFA-263** **Virtual Production II**
Virtual Production II addresses advanced topics in the evolving field of virtual cinematic and television production and serves as a practical film workshop following successful completion of Virtual Production I. Students will develop mastery of the techniques and workflows associated with virtual production and previsualization using current and future hardware and software, computer graphics, immersive technology, real-time rendering, game engines, and practical filmmaking. Students will use project management techniques and work in teams to produce short fiction projects using virtual production technologies. Students specializing in a cinematic craft or engineering will contribute their role-specific skills to the projects. Intensive pre-production protocol and documentation are followed. VFX, editing and sound design will be completed through post-production workflows as well. Students will complete projects for screening at the end of the semester. (Prerequisite: SOFA-262 or equivalent course.) **Lab 3, Credits 3 (Fall)**
- SOFA-263** **Virtual Production II**
Virtual Production II addresses advanced topics in the evolving field of virtual cinematic and television production and serves as a practical film workshop following successful completion of Virtual Production I. Students will develop mastery of the techniques and workflows associated with virtual production and previsualization using current and future hardware and software, computer graphics, immersive technology, real-time rendering, game engines, and practical filmmaking. Students will use project management techniques and work in teams to produce short fiction projects using virtual production technologies. Students specializing in a cinematic craft or engineering will contribute their role-specific skills to the projects. Intensive pre-production protocol and documentation are followed. VFX, editing and sound design will be completed through post-production workflows as well. Students will complete projects for screening at the end of the semester. (Prerequisite: SOFA-262 or equivalent course.) **Lecture 2, Credits 3 (Fall)**
- SOFA-303** **Animation Workshop II**
Students will explore phases of animation short film production in their area of interest as determined by their experiences with their second-year films. Through identification of project needs and exploration and fulfillment of determined objectives, unique filmic assets will be created. (Prerequisites: SOFA-217 or equivalent course.) **Critique 3, Credits 3 (Fall or Spring)**
- SOFA-306** **Senior Capstone Seminar**
Students discuss and generate written plans for their senior films or capstone projects. Each student will secure a film and animation faculty adviser for their senior year. (Co-requisite: Successful completion of one of the following courses: SOFA-211 or SOFA-212 or SOFA-213 or equivalent courses.) **Lecture 2, Credits 2 (Spring)**
- SOFA-307** **SOFA: Contemporary Issues**
The fields of film and animation are in constant flux; responding to politics, global conflicts, economy, new technologies, and reflecting the story-telling from the cultures, communities, and histories of the makers. Through selected topics, this course will expand the scope and understanding of contemporary issues within film and animation. Course content will cover various forms of books, articles, essays, screening, and the makers' role from the perspective of contemporary issues. (Prerequisites: SOFA-541 or SOFA-202 or equivalent course.) **Lecture, Credits 1 - 3 (Fall or Spring)**
- SOFA-311** **Image Capture and Production Technology**
This course offers a full investigation of image capture technologies used in contemporary motion picture production. Historical image generation techniques will be provided as an introduction to modern media and equipment. Fundamental characteristics of silver halide photochemical imaging systems will be explored with emphasis on typical metrology and imaging properties. Electronic image capture will also be presented in the context of fundamental imaging properties. Standard film and video workspaces and workflows will be examined as a direct introduction to post-production technologies to be presented in subsequent motion picture science courses. (Prerequisites: SOFA-103 and IMGS-221 and IMGS-351 or equivalent course.) **Lab 3, Credits 3 (Fall)**
- SOFA-311** **Image Capture and Production Technology**
This course offers a full investigation of image capture technologies used in contemporary motion picture production. Historical image generation techniques will be provided as an introduction to modern media and equipment. Fundamental characteristics of silver halide photochemical imaging systems will be explored with emphasis on typical metrology and imaging properties. Electronic image capture will also be presented in the context of fundamental imaging properties. Standard film and video workspaces and workflows will be examined as a direct introduction to post-production technologies to be presented in subsequent motion picture science courses. (Prerequisites: SOFA-103 and IMGS-221 and IMGS-351 or equivalent course.) **Lecture 2, Credits 3 (Fall)**
- SOFA-312** **Digital Post Production Technology**
This course will focus on the specific technologies of motion picture post-production and imaging science. Motion content generated via film or electronic technologies on set are ingested into the post-production chain utilizing various optical, opto-mechanical, and electronic systems. Topics will include video standards, telecine transfer, digital color spaces, digital intermediate, special effects, color correction, and image processing. Motion content mastering will be explored as an introduction to exhibition technologies to be presented in the final motion picture science course. Particular emphasis will be placed on production equipment testing, data acquisition and image analyses. (Prerequisites: SOFA-311 or equivalent course and completion of First Year Writing (FYW) requirement.) **Lab 4, Credits 3 (Spring)**
- SOFA-312** **Digital Post Production Technology**
This course will focus on the specific technologies of motion picture post-production and imaging science. Motion content generated via film or electronic technologies on set are ingested into the post-production chain utilizing various optical, opto-mechanical, and electronic systems. Topics will include video standards, telecine transfer, digital color spaces, digital intermediate, special effects, color correction, and image processing. Motion content mastering will be explored as an introduction to exhibition technologies to be presented in the final motion picture science course. Particular emphasis will be placed on production equipment testing, data acquisition and image analyses. (Prerequisites: SOFA-311 or equivalent course and completion of First Year Writing (FYW) requirement.) **Lecture 2, Credits 3 (Spring)**
- SOFA-313** **Film Projection and Digital Cinema**
As the final course in the motion picture science core technology sequence, this class completes the study of motion picture technologies, focusing on exhibition and display engineering. Topics covered include traditional mechanical film projection, electronic projection and the color science associated with image appearance. Special focus will be given to evolving exhibition standards, image quality evaluations and emerging techniques. The course will conclude with an investigation of 3D technologies and varied distribution models for motion content. (Prerequisites: SOFA-312 or equivalent course.) **Lab 3, Credits 3 (Fall)**
- SOFA-313** **Film Projection and Digital Cinema**
As the final course in the motion picture science core technology sequence, this class completes the study of motion picture technologies, focusing on exhibition and display engineering. Topics covered include traditional mechanical film projection, electronic projection and the color science associated with image appearance. Special focus will be given to evolving exhibition standards, image quality evaluations and emerging techniques. The course will conclude with an investigation of 3D technologies and varied distribution models for motion content. (Prerequisites: SOFA-312 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

SOFA-316**3D Animation III**

This course is a continuation of 3D Animation II. Students examine facial expressions and learn how to create emotion in the face. Advanced rigging techniques, especially pertaining to the faces, will be presented. Students will be presented with techniques to dissect sentences and reconstruct them in to useable connected speech for animated characters. Students will produce a series of short three-dimensional computer animations using a pre-rigged character. (Prerequisite: SOFA-216 or equivalent course.) **Lab 3, Credits 3 (Spring)**

SOFA-316**3D Animation III**

This course is a continuation of 3D Animation II. Students examine facial expressions and learn how to create emotion in the face. Advanced rigging techniques, especially pertaining to the faces, will be presented. Students will be presented with techniques to dissect sentences and reconstruct them in to useable connected speech for animated characters. Students will produce a series of short three-dimensional computer animations using a pre-rigged character. (Prerequisite: SOFA-216 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

SOFA-317**Animation Production Workshop II**

Students will explore all phases of animation short film production. Students design and produce a short film with sound that must be screened for the RIT community. (Prerequisites: SOFA-217 or equivalent course.) **Lecture 4, Credits 4 (Fall)**

SOFA-323**2D Animation II: Performance**

This course will focus on the continued development of students' skills in the two-dimension animation medium, using computer software. As an intermediate course, students will build on the skills they accrued as well as learn new, advanced techniques. A variety of examples of 2D computer animation will be screened in class. (Prerequisites: SOFA-218 or equivalent course.) **Studio 6, Credits 3 (Spring)**

SOFA-355**Study Abroad Topics in Animation**

Students will study cultural, social, and/or environmental issues based on location. Students will work individually or as a collaborative team through the concept, planning, design and building of an animated film project. This course may be retaken for credit, however topics may have limits on the number of times students may retake. Travel fees will be required. Permission to enroll is required. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

SOFA-363**Intro Computational Photograph**

This course provides an introduction to the field of computational photography. Students will be exposed to the latest techniques in computational photography, the imaging fundamentals associated with them and the potential applications in the fields of photography and motion imaging. The course will focus on some radiometry and image processing fundamentals along with the review of technical papers covering the latest research in the field. Programming projects will provide students with hands-on experience related to the concepts presented. (Prerequisites: IMGS-251 and IMGS-361 student standing in DIGCIME-BS or IMGS-BS.) **Lecture 3, Credits 3 (Spring)**

SOFA-375**Reel World Production**

Students and at least one faculty member collaboratively produce a film and/or animation production determined prior to the start of class. Students attend class and work on the production in specific job functions. Students should contact the instructor for details and permission to enroll. **Studio 6, Credits 2 (Fall, Spring)**

SOFA-386**Team Film: Animation Production Workshop**

This course provides an opportunity to work on a short film production as a part of a team. Students will serve multiple roles in the production depending on skills and the needs of the team. The production will focus on an area of social change or community within the Greater Rochester area, with the potential to work with non-profit groups directly. Productions using varied and multiple techniques including the mix of live action with animation are encouraged. Productions techniques will be decided based on the skills of the students enrolled. The final film will be screened for the RIT community. (Prerequisites: SOFA-317 or equivalent course.) **Lecture 4, Credits 4 (Spring)**

SOFA-399**Film and Animation Part-Time Co-op**

Cooperative Education will provide School of Film and Animation students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in FILMAN-BFA or DIGCIME-BS with at least 3rd year standing and department permission.) **CO OP, Credits 0 (Fall, Spring, Summer)**

SOFA-401**Senior Project I**

In this course student's in their final year begin work on a major student project. Students may work on projects including motion picture engineering, image science research or relevant craft. Students are in charge of their own work, but they work directly with an adviser to track their progress on the project. The class meets one hour each week to provide discussion on project progress and learning. (This class is restricted to students in the DIGCIME-BS program.) **Lecture 1, Credits 3 (Fall)**

SOFA-402**Senior Project II**

A continuation of Senior Project I, in this course students in their final year continue work on a major student project. Students may work on projects including motion picture engineering, image science research or relevant craft. Students are in charge of their own work, but they work directly with an adviser to track their progress on the project. The class meets one-hour each week to provide discussion on project progress and learning. (Prerequisites: SOFA-401 or equivalent course and student standing in DIGCIME-BS.) **Lecture 1, Credits 3 (Spring)**

SOFA-406**Senior Capstone I**

Students work independently with their advisor towards completion of their capstone experience for their BFA degree. Students have a predetermined timeline and must complete all deadlines to pass this course. (Prerequisite: SOFA-306 or equivalent course.) **Lecture 4, Credits 4 (Fall)**

SOFA-407**Senior Capstone II**

Students work independently with their advisor towards completion of their capstone experience for their BFA degree. Students have a predetermined timeline and must complete all deadlines of that timeline to pass this thesis course including completion and public screening of finished work or final presentation of craft experience. (Prerequisites: SOFA-406 or equivalent course.) **Lecture 4, Credits 4 (Spring)**

SOFA-408**Senior Forum**

This course is intended to best accompany and complement the student's Senior Thesis experience. All students in this course meet as a group to screen edited works in progress, discuss post-production problems, and plan jointly for the use of departmental production resources. (Prerequisites: SOFA-306 or equivalent course.Co-requisite: SOFA-406 or equivalent course.) **Lecture 2, Credits 1 (Fall, Spring)**

SOFA-411**Animation Capstone I**

The first of two classes designed to advance students toward the completion of a capstone. It will advance students from capstone proposal toward the completion of a project. Students will also take part in weekly critiques to present their work and discuss the work of their classmates. At the completion of this course, students should be at the halfway point of their set project. (Prerequisites: SOFA-306 or (SOFA-317 and IDEA-150) or equivalent course.) **Lecture 4, Credits 4 (Fall)**

SOFA-412**Animation Capstone II**

This course will lead students toward the completion of their capstone. Students will take part in weekly critiques to present their work and discuss the work of their classmates. At the completion of this course, students will complete their capstone and take part in a public screening of their finished work. (Prerequisite: SOFA-411 or equivalent course.) **Lecture 4, Credits 4 (Spring)**

SOFA-416**Production Capstone I**

The first of two classes designed to advance students toward the completion of a capstone. It will advance students from capstone proposal toward the completion of a project. Students will also take part in weekly critiques to present their work and discuss the work of their classmates. At the completion of this course, students should be at the halfway point of their set project. (Prerequisite: SOFA-306 or equivalent course.) **Lecture 4, Credits 4 (Fall)**

SOFA-417**Production Capstone II**

This course will lead students toward the completion of their capstone. Students will take part in weekly critiques, present their work, and discuss the work of their classmates. At the end of this course, students will complete their capstone and take part in a public screening of their finished work or craft experience. (Prerequisite: SOFA-416 or equivalent course.) **Lecture 4, Credits 4 (Fall)**

SOFA-498**Film and Animation Internship**

Film and Animation Internship is available to film and animation third year students with a minimum of a 2.5 GPA. Internships must be within the film and animation industry. Students must submit a completed approval form identifying the firm and listing their internship responsibilities. Internships are approved by the Undergraduate Program Director or School Director. Students are required to obtain a letter of review from their job site supervisor. To earn 1 credit, a total of 41.25 hours a semester is required (an average of 2.75 hours of work per week for 15 weeks). (Prerequisites: This class is restricted to students in FILMAN-BFA or DIGCIME-BS with at least a 2.5 cumulative GPA and department permission to enroll.) **Internship, Credits 1 - 12 (Fall, Spring, Summer)**

SOFA-499

Film and Animation Co-op

Cooperative Education will provide Film and Animation students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in FILMAN-BFA or DIGCIME-BS with at least 3rd year standing and department permission.) **CO OP, Credits 0 (Fall, Spring, Summer)**

SOFA-501

Animatic Day

This course will allow students the opportunity to receive feedback on their in-progress capstone project. Students will be required to submit their work by a determined deadline and then take constructive feedback. At the completion of this course, students will decide how to implement the criticism they received with their advisor to better their work. 20 hours of class over one weekend in fall semester. (Co-requisite: SOFA-411 or equivalent course.) **Lecture 14, Credits 1 (Fall)**

SOFA-502

Production Processes

This course is an introduction to all aspects of professional film/video narrative production. Students produce short projects while learning basic shooting and crewing procedures, studio protocol, equipment handling and maintenance, and basic sync editing. (Prerequisites: SOFA-105 or SOFA-205 or equivalent course.) **Lecture 2, Credits 6 (Fall or Spring)**

SOFA-502

Production Processes

This course is an introduction to all aspects of professional film/video narrative production. Students produce short projects while learning basic shooting and crewing procedures, studio protocol, equipment handling and maintenance, and basic sync editing. (Prerequisites: SOFA-105 or SOFA-205 or equivalent course.) **Studio 10, Credits 6 (Fall or Spring)**

SOFA-505

Acting for Film

A course in basic acting technique with an emphasis on the requirements of film production. Students are introduced to various approaches to acting through exercises and by performing in scenes from professional productions. Scenes are rehearsed outside of class, and then staged and critiqued during class time. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 3, Credits 3 (Fall, Spring)**

SOFA-506

Production In-Progress Screening

This course will allow students the opportunity to receive additional feedback on their capstone project. The course content will take place over a one-week or one-weekend experience during the semester. (Co-requisite: SOFA-417 or equivalent course.) **Lecture 14, Credits 1 (Spring)**

SOFA-511

Film Sound Theory: Music

This course is one of three in the study of film sound theory. Through readings, focused group discussion, and the viewing of/listening to select films, the course promotes critical analysis of the varied and profound uses of music in sound design. Addressed is the history of music from the silent era to the modern score. The concepts studied include the modal changes in point-of-audition, and positioning across diegeses. Newer topics including audio-visualization and ventriloquism theory are also addressed. (This course is available to RIT degree-seeking undergraduate students.) **Lec/Lab 6, Credits 3 (Fall, Spring, Summer)**

SOFA-512

Film Sound Theory: Effects

This course is one of three in the study of film sound theory. Through readings, focused group discussion, and the viewing of/listening to select films, the course promotes critical analysis of the varied and profound uses of effects in sound design. Addressed is the history of effects from the early sound era to the modern design. The concepts studied include the modal changes in point-of-audition, and positioning across diegeses. Other topics like complementarity and the acousmetre acousmatic are also addressed. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 3, Credits 4 (Fall, Spring, Summer)**

SOFA-512

Film Sound Theory: Effects

This course is one of three in the study of film sound theory. Through readings, focused group discussion, and the viewing of/listening to select films, the course promotes critical analysis of the varied and profound uses of effects in sound design. Addressed is the history of effects from the early sound era to the modern design. The concepts studied include the modal changes in point-of-audition, and positioning across diegeses. Other topics like complementarity and the acousmetre acousmatic are also addressed. (This course is available to RIT degree-seeking undergraduate students.) **Seminar 3, Credits 4 (Fall, Spring, Summer)**

SOFA-513

Film Sound Theory:Voice

Through readings, focused group discussion, and the viewing/listening of select films, the course promotes critical analysis of the varied and profound uses of voice in sound design. The history of voice from the silent era to the modern sound design will be addressed. The concepts studied include the modal changes in point-of-audition, and positioning across diegeses. Other topics will also be addressed: vococentric mixing and separation, dialogue theory, etc. At the conclusion of the course each student will present on a chosen concept within film voice theory. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 3, Credits 4 (Fa/sp/su)**

SOFA-513

Film Sound Theory:Voice

Through readings, focused group discussion, and the viewing/listening of select films, the course promotes critical analysis of the varied and profound uses of voice in sound design. The history of voice from the silent era to the modern sound design will be addressed. The concepts studied include the modal changes in point-of-audition, and positioning across diegeses. Other topics will also be addressed: vococentric mixing and separation, dialogue theory, etc. At the conclusion of the course each student will present on a chosen concept within film voice theory. (This course is available to RIT degree-seeking undergraduate students.) **Lab 3, Credits 4 (Fa/sp/su)**

SOFA-514

Business and Careers in Film

An introduction to all aspects of the business side of professional film/video narrative documentary and commercial production. Students will form production companies and develop a business plan while considering alternative careers in film, basic financial and legal protocol, and mental preparation needed to enter the film business market. Resumes and reels are assigned projects. (Prerequisite: SOFA-202 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

SOFA-516

Virtual Production I

Virtual Production I introduces the theory and practice in the evolving field of virtual cinematic and television production. Students are exposed to the techniques and workflows associated with virtual production and previsualization using current and future hardware and software, computer graphics, immersive technology, real-time rendering, game engines, and practical filmmaking. Technologies addressed include AR (augmented reality) and VR (virtual reality) for scouting, environment and asset creation, motion capture for previsualization and real-time production, virtual cinematography, lighting design, real-time visual effects (VFX), and set extension. Students will use project management techniques and work in teams to research and develop an array of pipeline and technology needs for the successful creation of creative narratives. By the completion of the course, students develop a working knowledge of engineering and design thinking and an immersion in the methods of teamwork in the disciplines which enable modern virtual production. (Prerequisites: This class is restricted to students with at least 2nd year standing.) **Lab 3, Credits 3 (Fall or Spring)**

SOFA-516

Virtual Production I

Virtual Production I introduces the theory and practice in the evolving field of virtual cinematic and television production. Students are exposed to the techniques and workflows associated with virtual production and previsualization using current and future hardware and software, computer graphics, immersive technology, real-time rendering, game engines, and practical filmmaking. Technologies addressed include AR (augmented reality) and VR (virtual reality) for scouting, environment and asset creation, motion capture for previsualization and real-time production, virtual cinematography, lighting design, real-time visual effects (VFX), and set extension. Students will use project management techniques and work in teams to research and develop an array of pipeline and technology needs for the successful creation of creative narratives. By the completion of the course, students develop a working knowledge of engineering and design thinking and an immersion in the methods of teamwork in the disciplines which enable modern virtual production. (Prerequisites: This class is restricted to students with at least 2nd year standing.) **Lecture 2, Credits 3 (Fall or Spring)**

SOFA-517

IT Fundamentals for Digital Media

This course will provide an overview of IT and networking fundamentals critical in emerging digital media workflows. Emphasis will be placed on the architecture of modern digital media production and post-production facilities. Media industry technology standards for cinema, television, internet and mobile consumption will be introduced. This course is designed for students in the College of Art and Design and the Golisano College of Computing and Information Sciences who are interested in mastering the basic principles of IT and networking infrastructures used in digital media and broadcast applications. (Prerequisites: SOFA-103 or NSSA-102 or equivalent course.) **Lab 3, Credits 3 (Fall)**

SOFA-517**IT Fundamentals for Digital Media**

This course will provide an overview of IT and networking fundamentals critical in emerging digital media workflows. Emphasis will be placed on the architecture of modern digital media production and post-production facilities. Media industry technology standards for cinema, television, internet and mobile consumption will be introduced. This course is designed for students in the College of Art and Design and the Golisano College of Computing and Information Sciences who are interested in mastering the basic principles of IT and networking infrastructures used in digital media and broadcast applications. (Prerequisites: SOFA-103 or NSSA-102 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

SOFA-518**Business and Careers in Animation**

This course will focus on the role of the small animation business owner, the studio employee, and the individual freelance animator in developing a small business. The elements of discussion will teach students how to approach animation work in the industry from a small business perspective. This course will discuss the creation of sample reels, websites, self-promotion, contracts, pitching, fund-raising, research and interview techniques all related to the individual in animation. Ethics and individual responsibilities will also be discussed. Professionals working in the animation industry will often be guests for the class. (Prerequisites: SOFA-317 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

SOFA-521**Advanced Sound Recording**

This course continues the work from Basic Sound Recording to include audio synchronized or locked to picture and the use of Foley and ADR production techniques. Students develop workflow approaches for complex multi-track mixing and signal manipulation. Each student prepares a mixed track to professional quality standards and manages sound and video files between various hardware and software platforms. (Prerequisite: SOFA-205 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

SOFA-522**Stop Motion Puppet Fundamentals**

This is an introductory course that will give students a basic and solid understanding of stop-motion animation. The class covers all aspects of stop-motion in its various forms but will mainly concentrate on stop-motion puppet/character animation. There will be demonstrations on model fabrication, animation techniques and camera/grip techniques. More in-depth topics, like latex and silicon mold making and intensive post production techniques will be introduced. There will be opportunities for students to practice animation with specific goals and assignments. (Prerequisite: SOFA-107 or equivalent course.) **Lab 3, Credits 3 (Fall)**

SOFA-522**Stop Motion Puppet Fundamentals**

This is an introductory course that will give students a basic and solid understanding of stop-motion animation. The class covers all aspects of stop-motion in its various forms but will mainly concentrate on stop-motion puppet/character animation. There will be demonstrations on model fabrication, animation techniques and camera/grip techniques. More in-depth topics, like latex and silicon mold making and intensive post production techniques will be introduced. There will be opportunities for students to practice animation with specific goals and assignments. (Prerequisite: SOFA-107 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

SOFA-523**Advanced Editing**

This course will focus on the professional workflow of editing digital film and video files, and study the technical craft as well as the aesthetic choices that editors make. Students will practice the editing of all genres by editing short fiction, documentary, and experimental projects. Exploration of advanced software will facilitate editing short projects and tutorials. Areas of study include learning a cinema file database, media management, color correction, visual and time-based effects, sound processing and track building, multi-camera editing, and titling and graphics. (Prerequisites: SOFA-102 or SOFA-101 or equivalent course.) **Lab 3, Credits 3 (Spring)**

SOFA-523**Advanced Editing**

This course will focus on the professional workflow of editing digital film and video files, and study the technical craft as well as the aesthetic choices that editors make. Students will practice the editing of all genres by editing short fiction, documentary, and experimental projects. Exploration of advanced software will facilitate editing short projects and tutorials. Areas of study include learning a cinema file database, media management, color correction, visual and time-based effects, sound processing and track building, multi-camera editing, and titling and graphics. (Prerequisites: SOFA-102 or SOFA-101 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

SOFA-524**Advanced Directing**

This course will offer in-depth study of techniques introduced in the basic directing class, with an additional focus on using external observation to determine appropriate behavior. This course emphasizes the problems in blocking for camera, peculiar to film and video production. Class meetings are organized around the presentation of scenes prepared by student directors using the acting students in the class. (Prerequisite: SOFA-206 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

SOFA-526**Writing the Short**

This course will explore the short screenplay as its own genre and as a stepping-stone to writing longer forms. Students will improve their ability to develop goals and obstacles and, thereby, create a complete narrative journey. Students will write approximately fifteen-minute film or animation scripts. Film scripts may be used in production courses. (Prerequisites: SOFA-112 or equivalent course.) **Lecture 3, Credits 3 (Fall or Spring)**

SOFA-529**Experimental Animation**

This course will explore the concept of animation as a fine art practice. Course content will cover various techniques and concepts within experimental animation. Lectures will be enriched through film screenings and in-depth class discussions and demonstrations. Students will explore adventurous techniques and mediums such as, but not limited to, direct-on-film processes, stop motion paint, phenakistoscopes, stratacuts, charcoal/chalk board palimpsests, maximum loop cycles, paper cut-out animation, and sound. By the completion of the course, students will have a thorough understanding of the scope of experimental animation techniques. (Prerequisite: SOFA-121 or equivalent course.) **Lab 3, Credits 3 (Fall or Spring)**

SOFA-529**Experimental Animation**

This course will explore the concept of animation as a fine art practice. Course content will cover various techniques and concepts within experimental animation. Lectures will be enriched through film screenings and in-depth class discussions and demonstrations. Students will explore adventurous techniques and mediums such as, but not limited to, direct-on-film processes, stop motion paint, phenakistoscopes, stratacuts, charcoal/chalk board palimpsests, maximum loop cycles, paper cut-out animation, and sound. By the completion of the course, students will have a thorough understanding of the scope of experimental animation techniques. (Prerequisite: SOFA-121 or equivalent course.) **Lecture 1, Credits 3 (Fall or Spring)**

SOFA-531**Digital Effects and Compositing**

This course will offer hands-on experience in manipulating live action video and applying digital effects. There is an emphasis on digital compositing using rotoscoping, image tracking, alpha channels and transparency. Composites may be accomplished through green screen shooting, transfer modes, masks, and/or traveling mattes. Node based compositing will also be addressed as well. (Prerequisites: SOFA-103 or SOFA-122 or equivalent course.) **Lab 3, Credits 3 (Fall)**

SOFA-531**Digital Effects and Compositing**

This course will offer hands-on experience in manipulating live action video and applying digital effects. There is an emphasis on digital compositing using rotoscoping, image tracking, alpha channels and transparency. Composites may be accomplished through green screen shooting, transfer modes, masks, and/or traveling mattes. Node based compositing will also be addressed as well. (Prerequisites: SOFA-103 or SOFA-122 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

SOFA-532**Underwater Cinematography**

This course is designed to prepare students to professionally complete cinematography assignments in an underwater environment. To accomplish this, the student will complete basic scuba diving training and achieve scuba diving certification. Students' will become familiar with underwater video camera housings and accessories and basic underwater shooting techniques. **There is a facilities fee required for this course, the facility fee covers all equipment, off campus facility use, texts and insurance.** (Prerequisite: SOFA-101 or SOFA-107 or SOFA-502 or PHAR-102 or equivalent course.) **Lab 3, Credits 3 (Fall)**

SOFA-532**Underwater Cinematography**

This course is designed to prepare students to professionally complete cinematography assignments in an underwater environment. To accomplish this, the student will complete basic scuba diving training and achieve scuba diving certification. Students' will become familiar with underwater video camera housings and accessories and basic underwater shooting techniques. **There is a facilities fee required for this course, the facility fee covers all equipment, off campus facility use, texts and insurance.** (Prerequisite: SOFA-101 or SOFA-107 or SOFA-502 or PHAR-102 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

SOFA-533**Advanced Stop Motion Techniques**

This course will introduce stop motion students to advanced techniques of photographic single frame production. This course will concentrate on fabrication techniques from sculpting to mold building, including an introduction to three-dimensional printing. History and the specific language of stop motion will be covered. Camera and camera lenses and lighting are explored along with various exercises in animation. (Prerequisites: SOFA-522 or equivalent course.) **Lab 3, Credits 3 (Spring)**

SOFA-533**Advanced Stop Motion Techniques**

This course will introduce stop motion students to advanced techniques of photographic single frame production. This course will concentrate on fabrication techniques from sculpting to mold building, including an introduction to three-dimensional printing. History and the specific language of stop motion will be covered. Camera and camera lenses and lighting are explored along with various exercises in animation. (Prerequisites: SOFA-522 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

SOFA-536

30-Second Commercial Production

An introduction into the world of producing television commercials. Students will learn the workflow between advertising agencies, their clients and production companies. Students will also execute the production of a television commercial from conception to editorial. (Prerequisites: SOFA-102 or SOFA-101 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

SOFA-541

History and Aesthetics of Animation

This course will explore the beginnings, the evolution, the creative and practical history of the animated film, including prehistory of animation, early film and animation history, major trends, artists, animation studios, theoretical distinctions and international identities in animation. Issues of animation aesthetics will also be elucidated through discussions, readings and reviews of exemplary films to emphasize the unique characteristics of the animated art form and how those characteristics are used as a means of interpretation and expression. Both orthodox and unorthodox animation will be highlighted. Films will be screened at every lecture. (Prerequisites: SOFA-121 or equivalent course and completion of First Year Writing (FYW) requirement.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

SOFA-542

History and Aesthetics: Animation Stories

This course will provide an in-depth study of an animation artist, animated genre, or other specific topics that has had a major impact on the animated film art form. Films will be viewed and discussed in the context of the specific times and places in which they were made. Emphasis will also be placed on determining the unique characteristics of the animation medium and how those characteristics are used as a means of interpretation and expression. (Prerequisite: SOFA-121 or equivalent course.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

SOFA-543

Targeting an Audience: Developing Content for TV

This course will introduce students to methods and strategies used by studios and TV networks to develop content that appeals to specific audiences. Students will gain insights into both the business and creative aspects of developing television content. Students will choose TV networks and study audience profiles. This information will then be used to create an appropriate 90-second film using the style and subject matter that fits the chosen network and its viewers. (Prerequisites: SOFA-102 or SOFA-101 or equivalent course.) **Lecture 3, Credits 3 (Fall or Spring)**

SOFA-555

Film Practice:

In this course students and faculty collaboratively produce a film project determined prior to the start of class. Students attend class and work on the production in specific job functions. The course may be taken up to two times for credit. Topics will be determined by the instructor. (Prerequisite: SOFA-212 or equivalent course.) **Studio 6, Credits 3 (Fall or Spring)**

SOFA-556

Transformative Trends in Entertainment

We are in a transformative age in entertainment. New technologies and platforms are changing the way filmmakers create content and also how consumers experience content, disrupting the traditional business models and creating new markets. This course will explore contemporary topics affecting today's entertainment industry through weekly live guest interviews and seminars from leading Hollywood experts in the areas of production, post-production, distribution, storytelling, visual effects, development, technology, streaming and emerging technologies. Students will interact with industry professionals, participate in online discussions and choose a topic of their own to explore with assistance and mentoring from guest speakers. **Lecture 3, Credits 3 (Fall or Spring)**

SOFA-557

Chasing Rainbows: Entertainment Distribution

As a student of entertainment, you will be entering the workforce at a time of major change in the way entertainment is produced, distributed and monetized. This course will focus on the big picture realities of today's entertainment media industry with an emphasis on the economic, technological and consumer forces that influence the creation and distribution of creative content. From the fracturing of the traditional studio system to the promise and pitfalls of new media platforms such as Netflix, Amazon and YouTube, students will gain an understanding of the issues and opportunities that exist in today's entertainment marketplace. **Lecture 3, Credits 3 (Fall, Spring)**

SOFA-558

Film Production Management

This course will focus on the business of motion picture production with a focus on narrative fiction. The course content will provide a basic understanding of workflow from script through distribution. Students will learn the expectations and organizational imperatives required to complete a project that is collaborative and resource intensive. (Prerequisites: SOFA-102 or SOFA-101 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

SOFA-561

New Documentary Issues

This course will examine the current trends in documentary film during the last decade. Students will view 1-2 documentary films each week. Students will examine each film critically; analyzing the film's theme, structure, style, relationship to reality, and effectiveness. In addition, students will examine how current filmmakers interpret and build upon the basic ideas and discourse that have defined documentary filmmaking since its beginnings. (Prerequisites: SOFA-106 or SOFA-131 or equivalent courses.) **Lec/Lab 4, Credits 3 (Fall)**

SOFA-562

Film History

This course examines selected, varying film topics in a wider socio-historical context. Seminar themes change each year and may include topics such as post-war German film, films of the Holocaust, Japanese film, surrealist and magic realist film, Soviet film, Native Americans on film, etc. Students are expected to participate actively in the course discussions. (Prerequisites: SOFA-106 or SOFA-131 or equivalent courses.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

SOFA-563

Writing the Feature

This course is an exploration of the feature film form. Students propose ideas for a feature length film and, in consultation with the instructor and other students, write a detailed step outline and a substantial portion of the first draft. (Prerequisites: SOFA-526 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

SOFA-564

Writing the Series

This course is an introduction to all forms of series writing for television and the Internet. Students will choose to write either a one-hour pilot for a dramatic series, or a half-hour pilot and an additional episode for a single-camera comedy series. All students will develop and write a series bible, a thorough description of all the characters and the world in which the series takes place as well as how the series may develop with future plot-lines. (Prerequisites: SOFA-526 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

SOFA-566

Documentary Film History

This course will examine the development of documentary film from 1920 to the present day. Students will explore central themes in documentary filmmaking, including the Grierson social documentary, the Flaherty romantic tradition, cinema verite, propaganda films, first-person narratives, and experimental documentary. Through film viewings, class discussions, and assigned readings, the students will critically examine how documentary film is constructed, keeping in mind the critical relationship between the film's content and its meaning. (Prerequisite: SOFA-131 or equivalent course.) **Lec/Lab 5, Credits 3 (Spring)**

SOFA-567

Digital Color Correction

This course offers project-based, hands-on color correction with both Da Vinci Resolve and Adobe. Introduction to basic color correction techniques and common tools in the industry will be provided. The course will progress from technical equipment setups and calibration to simple primary color correction to advanced secondary and color separation methods. Through assigned projects, students will be taught how to use tone and color to augment theatrical storytelling and add a dimension of professional finish to their films. (Prerequisite: SOFA-202 or equivalent course.) **Lab 2, Credits 3 (Fall)**

SOFA-567

Digital Color Correction

This course offers project-based, hands-on color correction with both Da Vinci Resolve and Adobe. Introduction to basic color correction techniques and common tools in the industry will be provided. The course will progress from technical equipment setups and calibration to simple primary color correction to advanced secondary and color separation methods. Through assigned projects, students will be taught how to use tone and color to augment theatrical storytelling and add a dimension of professional finish to their films. (Prerequisite: SOFA-202 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

SOFA-568

Digital Color Management

This course offers a comprehensive study of the methods and techniques used to manage and interchange color in digital color-imaging systems. The principles of colorimetry and densitometry will be reviewed and applied specifically to practical color imaging applications. The fundamental colorimetric properties of color imaging media, devices and systems will be explored and compared. Digital color encoding principles will be examined, and the features and limitations of various digital color encoding methods will be described. Course topics will be discussed in terms of their application in commercial color-managed systems, such as the ICC and AMPAS ACES systems. (Prerequisite: IMGS-351 or IMSM-302 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

SOFA-569

Introduction to Digital Imaging Technician

By introducing the role of the digital imaging technician (DIT) and digital asset manager (DAM), this course teaches the terminology, tools, and procedures to understand the applied theory and management of digital cinema workflows, including data management, color correction, and final delivery of a finished product. These roles are particularly instrumental in managing media from production to post-production. The course is designed for students that have a background in cinematography. The focus will be on how to manage projects with multiple audio and imaging sources. There will be additional emphasis on working collaboratively with the director and cinematographer to create the look and tone of the film using color correction. (Prerequisite: SOFA-202 or equivalent course and at students in FILMAN-BFA or DIGCIME-BS programs.) **Lab 3, Credits 3 (Spring)**

SOFA-569**Introduction to Digital Imaging Technician**

By introducing the role of the digital imaging technician (DIT) and digital asset manager (DAM), this course teaches the terminology, tools, and procedures to understand the applied theory and management of digital cinema workflows, including data management, color correction, and final delivery of a finished product. These roles are particularly instrumental in managing media from production to post-production. The course is designed for students that have a background in cinematography. The focus will be on how to manage projects with multiple audio and imaging sources. There will be additional emphasis on working collaboratively with the director and cinematographer to create the look and tone of the film using color correction. (Prerequisite: SOFA-202 or equivalent course and at students in FILMAN-BFA or DIGCIME-BS programs.) **Lecture 2, Credits 3 (Spring)**

SOFA-571**Advanced Production Immersion**

This workshop provides students with the opportunity to learn more about a particular area of production such as editing, cinematography, lighting, sound. This course will be taught with an industry professional. This course can be taken multiple times but individual topics must be different. (Prerequisites: SOFA-102 or SOFA-101 or equivalent course.) **Lecture 3, Credits 3 (Fall or Spring)**

SOFA-572**Mixing and Sound Design**

Continue the work from Advanced Sound Recording by mixing multi-track sessions with video to post-produce several different projects to professional standards. Learn how to listen and develop a trained ear while understanding proper equalization and use of effects and digital signal routing. Sessions can include documentaries, dialog and musical productions. Create templates and develop editing/mixing techniques to balance creativity and time constraints of a typical project. (Prerequisites: SOFA-521 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

SOFA-573**Fusion Production**

In this course, students will learn and practice the art of collaboration and conceive and produce projects that combine various cinematic and related art media, including live action, two-dimensional animation, three-dimensional animation, interactive media, performance, and music. Projects may include practical techniques of camera matching, compositing, match lighting, blur, color, contrast and perspective across composited media, and a variety of post-production strategies and processes. Projects may involve characters and objects interacting across different media. Students from a variety of disciplines may contribute their expertise to the group projects. (Prerequisites: SOFA-215 or SOFA-216 or SOFA-533 or SOFA-202 or equivalent course.) **Lec/Lab 4, Credits 3 (Spring)**

SOFA-574**Documentary Field Production**

Students in this course will work in small documentary crews of 3-4, shooting weekly assignments in the field. We will shoot digital HD format in these group projects. Emphasis will be on developing a shooting intuition, gathering clean sound, shooting to edit, and interviewing skills. We will also shoot one project using multiple cameras. We will examine different creative approaches to reality subjects and test possible techniques such as incorporating fiction techniques. Students will be expected to edit the projects they direct into short 3-4 minute films for class critiques. (Prerequisites: SOFA-102 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

SOFA-575**3D Lighting and Rendering**

This course is an intensive look at lighting for three-dimensional animation pipelines. Students will learn to observe, plan and replicate real-world environments and expand those into artistic interpretations of style and design. There will be a strong focus on surfacing, set-dressing, production design, as well as economical rendering techniques. Students will learn to identify the balance between artistic needs and technical limitations and how to adequately prepare a scene for post-production practices. (Prerequisite: SOFA-216 or equivalent course.) **Lab 3, Credits 3 (Spring)**

SOFA-575**3D Lighting and Rendering**

This course is an intensive look at lighting for three-dimensional animation pipelines. Students will learn to observe, plan and replicate real-world environments and expand those into artistic interpretations of style and design. There will be a strong focus on surfacing, set-dressing, production design, as well as economical rendering techniques. Students will learn to identify the balance between artistic needs and technical limitations and how to adequately prepare a scene for post-production practices. (Prerequisite: SOFA-216 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

SOFA-578**Advanced Cinematography I**

This advanced level course will enable students to develop an appreciation for the multi-dimensional nature of the craft of cinematography and provide them with theoretical, technical and practical knowledge. Students will explore visual aesthetics and engage in conceptual and critical thinking. They will also learn about industry standards, best practices, and workflows and channel their learning into class projects. (Prerequisite: SOFA-202 or equivalent course.) **Lecture 4, Credits 4 (Fall or Spring)**

SOFA-581**Particles and Dynamics**

This course is an introduction to the creation of three-dimensional generated visual effects designed to enhance film and animation productions. This includes everything from generated particle animation to dynamic simulations of fluid, hair, and cloth. Students will work across multiple applications and learn to successfully integrate various elements into cohesive scenes. (Prerequisite: SOFA-215 or equivalent course.) **Lab 3, Credits 3 (Fall)**

SOFA-581**Particles and Dynamics**

This course is an introduction to the creation of three-dimensional generated visual effects designed to enhance film and animation productions. This includes everything from generated particle animation to dynamic simulations of fluid, hair, and cloth. Students will work across multiple applications and learn to successfully integrate various elements into cohesive scenes. (Prerequisite: SOFA-215 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

SOFA-582**Alternative Frame by Frame**

This course will give all students a chance to explore three different approaches to stop-motion animation. The class will study and experiment with pixilation, time-lapse and relief animation with a "down-shooter." These techniques will expand the student's knowledge of traditional and experimental animation and present an alternative means of expression. The class will study existing work with these techniques, analyze and discuss them with the instructor and then produce several examples of their own work after instruction for each approach. There will be a final project in the technique of the student's choice. (This class is restricted to students with majors in CAD and at least 3rd year student standing.) **Lecture 3, Credits 3 (Fall)**

SOFA-583**Building the 3D Character**

This course is an intensive exploration of the process of character creation, specifically character rigging for digital animation. Students will learn to build a working rig by applying their research into body mechanics, character deformation, and dynamic restructuring. By combining their understanding of aesthetic character creation with the study of three-dimensional technology, the course is designed to teach automation through code-building and expressions. (Prerequisites: SOFA-209 or equivalent course.) **Lab 3, Credits 3 (Fall)**

SOFA-583**Building the 3D Character**

This course is an intensive exploration of the process of character creation, specifically character rigging for digital animation. Students will learn to build a working rig by applying their research into body mechanics, character deformation, and dynamic restructuring. By combining their understanding of aesthetic character creation with the study of three-dimensional technology, the course is designed to teach automation through code-building and expressions. (Prerequisites: SOFA-209 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

SOFA-586**Programming for 3D Animators**

This programming course is designed specifically for artists and animators with little or no programming experience. It is designed to give students the ability to solve software problems by making their own tools or finding existing tools. All of the assignments and examples in class are graphics related and will include tools for animation, rigging, particles, texturing and modeling. (Prerequisite: SOFA-215 or equivalent course.) **Lab 3, Credits 3 (Spring)**

SOFA-586**Programming for 3D Animators**

This programming course is designed specifically for artists and animators with little or no programming experience. It is designed to give students the ability to solve software problems by making their own tools or finding existing tools. All of the assignments and examples in class are graphics related and will include tools for animation, rigging, particles, texturing and modeling. (Prerequisite: SOFA-215 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

SOFA-587**Digital Sculpting**

Students will learn organic and hard surface modeling using digital sculpting techniques. Students will apply surface texturing to give a realistic painted appearance. Techniques for cutting and building surfaces to create both rigid and soft surfaces will be implemented. (Prerequisites: SOFA-209 or equivalent course.) **Lab 3, Credits 3 (Spring)**

SOFA-587**Digital Sculpting**

Students will learn organic and hard surface modeling using digital sculpting techniques. Students will apply surface texturing to give a realistic painted appearance. Techniques for cutting and building surfaces to create both rigid and soft surfaces will be implemented. (Prerequisites: SOFA-209 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

SOFA-588**DVD Authoring**

This course is designed to introduce the design and practices of DVD development with emphasis on creating cut variations (e.g., director's cut, screen cut) of an existing film project. The student develops a specific DVD that is based on a film they have completed. Class discussion and presentation are oriented towards new directions for the film story with interactivity and sequencing considerations. The student will acquire development tools to include: menu development, subtitles, audio streams, encoding principles, hybrid DVD creation, web linking, and basic scripting. (Prerequisite: SOFA-101 or equivalent course.) **Lab 3, Credits 3 (Spring)**

SOFA-588

DVD Authoring

This course is designed to introduce the design and practices of DVD development with emphasis on creating cut variations (e.g., director's cut, screen cut) of an existing film project. The student develops a specific DVD that is based on a film they have completed. Class discussion and presentation are oriented towards new directions for the film story with interactivity and sequencing considerations. The student will acquire development tools to include: menu development, subtitles, audio streams, encoding principles, hybrid DVD creation, web linking, and basic scripting. (Prerequisite: SOFA-101 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

SOFA-589

Advanced Cinematography II

This course focuses on skill development in select advanced cinematography topics. Students will build on foundational concepts in Advanced Cinematography I and enhance their cinematography practice. The goal of this course is to enable students to explore and develop their personal cinematography style. (Prerequisites: SOFA-578 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall or Spring)**

SOFA-590

Los Angeles Behind the Scenes

An exploration of the interconnected careers of the entertainment industry and the city of Los Angeles for a behind-the-scenes look at either film or animation. Students travel during the winter break. During the course students will discuss the industry, city, and their travel. This course has a mandatory travel component and requires an additional travel fee. Permission to enroll is required. (This course is restricted to students in the FILMAN-BFA and DIGCIME-BS programs.) **Lecture 3, Credits 3 (Spring)**

SOFA-599

SOFA Independent Study

SOFA Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser, should propose a course of study or project with clearly defined deliverables. Students must obtain permission of an instructor and complete the Independent Study Permission Form to enroll. Student must have a minimum of a 3.0 GPA to apply. (Prerequisites: This class is restricted to students in FLIMAN-BFA or DIGCIME-BS with at least a 3.0 cumulative GPA and department permission to enroll.) **Ind Study, Credits 1 - 6 (Fall, Spring, Summer)**

School of Photographic Arts and Sciences

Photographic and Imaging Arts

PHAR-101

Photographic Arts I

This course will provide an immersive introduction to the field of the photographic arts. It will emphasize both craft and visual problem solving. The course will explore: seeing and appreciating the quality of light, image capture, photographic vision, historical and contemporary genres of photography, best practices and workflow as well as an introduction to the critique forum and its practices. (Co-requisites: PHPS-106 or equivalent course.) **Critique 2, Credits 4 (Fall, Spring)**

PHAR-101

Photographic Arts I

This course will provide an immersive introduction to the field of the photographic arts. It will emphasize both craft and visual problem solving. The course will explore: seeing and appreciating the quality of light, image capture, photographic vision, historical and contemporary genres of photography, best practices and workflow as well as an introduction to the critique forum and its practices. (Co-requisites: PHPS-106 or equivalent course.) **Lecture 1, Credits 4 (Fall, Spring)**

PHAR-101

Photographic Arts I

This course will provide an immersive introduction to the field of the photographic arts. It will emphasize both craft and visual problem solving. The course will explore: seeing and appreciating the quality of light, image capture, photographic vision, historical and contemporary genres of photography, best practices and workflow as well as an introduction to the critique forum and its practices. (Co-requisites: PHPS-106 or equivalent course.) **Lab 3, Credits 4 (Fall, Spring)**

PHAR-102

Photographic Arts II

This course will reinforce and build upon the skills learned in the first semester of Photographic Arts I. It will emphasize aesthetics, craft, visual problem solving and critical thinking skills - the foundations of the Photographic Arts curriculum. In this semester, the studio will be introduced as a space that can be used to create and control light. This course's curriculum will continue to emphasize both craft and visual problem solving required in high-level photographic imaging. (Prerequisites: PHAR-101 or equivalent course.) **Critique 2, Credits 4 (Fall, Spring)**

PHAR-102

Photographic Arts II

This course will reinforce and build upon the skills learned in the first semester of Photographic Arts I. It will emphasize aesthetics, craft, visual problem solving and critical thinking skills - the foundations of the Photographic Arts curriculum. In this semester, the studio will be introduced as a space that can be used to create and control light. This course's curriculum will continue to emphasize both craft and visual problem solving required in high-level photographic imaging. (Prerequisites: PHAR-101 or equivalent course.) **Lecture 1, Credits 4 (Fall, Spring)**

PHAR-102

Photographic Arts II

This course will reinforce and build upon the skills learned in the first semester of Photographic Arts I. It will emphasize aesthetics, craft, visual problem solving and critical thinking skills - the foundations of the Photographic Arts curriculum. In this semester, the studio will be introduced as a space that can be used to create and control light. This course's curriculum will continue to emphasize both craft and visual problem solving required in high-level photographic imaging. (Prerequisites: PHAR-101 or equivalent course.) **Lab 3, Credits 4 (Fall, Spring)**

PHAR-150

Introduction to Film Photography

An introduction to technical, aesthetic, and conceptual topics in black-and-white still photography for non-photography majors. Through weekly assignments, students will become familiar with the operation of a 35mm camera body, lenses, and film processing and printing, while exploring basic principles of lighting, depth of field, principles of design, blur, stop motion, exposure, and tone control. Lectures will address photographic aesthetics, in addition to historical, contemporary and innovative practices. Students will engage in the language of the critique through participation in discussions of photographic shooting assignments. Students are required to provide their own 35mm camera, film and processing, and photo paper. Non-Photo majors only. **Fee: This course has a facilities fee for Non-SPAS students** (This course is available to RIT degree-seeking undergraduate students.) **Lab 4, Credits 3 (Fall, Spring)**

PHAR-150

Introduction to Film Photography

An introduction to technical, aesthetic, and conceptual topics in black-and-white still photography for non-photography majors. Through weekly assignments, students will become familiar with the operation of a 35mm camera body, lenses, and film processing and printing, while exploring basic principles of lighting, depth of field, principles of design, blur, stop motion, exposure, and tone control. Lectures will address photographic aesthetics, in addition to historical, contemporary and innovative practices. Students will engage in the language of the critique through participation in discussions of photographic shooting assignments. Students are required to provide their own 35mm camera, film and processing, and photo paper. Non-Photo majors only. **Fee: This course has a facilities fee for Non-SPAS students** (This course is available to RIT degree-seeking undergraduate students.) **Lecture 2, Credits 3 (Fall, Spring)**

PHAR-160

Intro to Digital Photography

An introduction to digital photography - technical, aesthetic, conceptual - for non-photography majors. Through weekly assignments, students will become familiar with the operation of a DSLR camera body/lens, while exploring the basic principles of lighting, depth of field, design, blur/stop motion, accurate exposure, and image manipulation. Lectures will address photographic aesthetics, contemporary and historical practices, and professional applications. Students will learn to critique work through participation in discussions of photographic assignments. Students are required to have their own DSLR (digital single-lens reflex) camera. Non-photo majors only. **A materials fee is required for this course and an additional facilities fee for non-SPAS students** (This course is open to all undergraduate students except those in PHTILL-BFA, PHIMAG-BFA, VISMED-BFA, PHIMTEC-BS, PHBM-BS and IMPT-BS.) **Lab 3, Credits 3 (Fall, Spring)**

PHAR-160

Intro to Digital Photography

An introduction to digital photography - technical, aesthetic, conceptual - for non-photography majors. Through weekly assignments, students will become familiar with the operation of a DSLR camera body/lens, while exploring the basic principles of lighting, depth of field, design, blur/stop motion, accurate exposure, and image manipulation. Lectures will address photographic aesthetics, contemporary and historical practices, and professional applications. Students will learn to critique work through participation in discussions of photographic assignments. Students are required to have their own DSLR (digital single-lens reflex) camera. Non-photo majors only. **A materials fee is required for this course and an additional facilities fee for non-SPAS students** (This course is open to all undergraduate students except those in PHTILL-BFA, PHIMAG-BFA, VISMED-BFA, PHIMTEC-BS, PHBM-BS and IMPT-BS.) **Lecture 2, Credits 3 (Fall, Spring)**

PHAR-161**Intermediate Digital Photography for Non-Majors**

This is the first required course for students enrolled in the photography minor. This course will reinforce and build upon the skills learned in Introduction to Digital Photography. It will emphasize aesthetics, craft, visual problem solving, skill development, and critical thinking skills. In this course, students will work in the studio and be introduced to the skills needed to use, create, and control artificial lighting as well as develop skills for modifying found light on location. Students will also make photographic prints. The curriculum will emphasize both craft and visual problem-solving skills necessary to achieve industry standards and prepare students for other courses available in the minor. Fee required for non-majors. (PHAR-160 or equivalent course.) **Lab 2, Credits 3 (Fall, Spring)**

PHAR-161**Intermediate Digital Photography for Non-Majors**

This is the first required course for students enrolled in the photography minor. This course will reinforce and build upon the skills learned in Introduction to Digital Photography. It will emphasize aesthetics, craft, visual problem solving, skill development, and critical thinking skills. In this course, students will work in the studio and be introduced to the skills needed to use, create, and control artificial lighting as well as develop skills for modifying found light on location. Students will also make photographic prints. The curriculum will emphasize both craft and visual problem-solving skills necessary to achieve industry standards and prepare students for other courses available in the minor. Fee required for non-majors. (PHAR-160 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring)**

PHAR-201**Elements of Fine Art Photography**

This course will offer students an introduction to the discipline of fine art photography. Conceptually driven projects will be investigated through a variety of photographic techniques; reading, writing and discussion about the intent and meaning of photographic imagery will be emphasized. Aspects of still photography and moving imagery as artistic choices and practices will be presented. The goal of the course is to establish theoretical, aesthetic and technical strategies for the production of photographic artwork. If you are pursuing the Fine Art Photography option this course is required. (Prerequisites: PHPS-102 or PHAR-102 or PHAR-161 or equivalent course.) **Lab 3, Credits 3 (Fall, Spring, Summer)**

PHAR-201**Elements of Fine Art Photography**

This course will offer students an introduction to the discipline of fine art photography. Conceptually driven projects will be investigated through a variety of photographic techniques; reading, writing and discussion about the intent and meaning of photographic imagery will be emphasized. Aspects of still photography and moving imagery as artistic choices and practices will be presented. The goal of the course is to establish theoretical, aesthetic and technical strategies for the production of photographic artwork. If you are pursuing the Fine Art Photography option this course is required. (Prerequisites: PHPS-102 or PHAR-102 or PHAR-161 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring, Summer)**

PHAR-202**Elements of Advertising Photography**

This course will provide an introduction to the field of commercial photography, as well as encourage students to develop their own artistic vision. Students will create images from assignments that relate to projects they will encounter after graduation. They will be instructed in the basic photographic skills needed in the commercial field. Practical use of exposure metering and digital workflow will be discussed. Training will be provided in the use of professional cameras and lighting equipment, as well as developing a web presence. Portraiture and still life photography will be covered both in the studio and on location. Students will learn about career choices available in the commercial photography business. (Prerequisites: PHPS-102 or PHAR-102 or equivalent course.) **Lab 3, Credits 3 (Fall, Spring, Summer)**

PHAR-202**Elements of Advertising Photography**

This course will provide an introduction to the field of commercial photography, as well as encourage students to develop their own artistic vision. Students will create images from assignments that relate to projects they will encounter after graduation. They will be instructed in the basic photographic skills needed in the commercial field. Practical use of exposure metering and digital workflow will be discussed. Training will be provided in the use of professional cameras and lighting equipment, as well as developing a web presence. Portraiture and still life photography will be covered both in the studio and on location. Students will learn about career choices available in the commercial photography business. (Prerequisites: PHPS-102 or PHAR-102 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring, Summer)**

PHAR-203**Elements of Photojournalism**

This course will serve an introduction to visual story telling as it relates to professional photojournalism. It will provide relevant practice in basic technical, compositional and interpersonal skills necessary in all aspects of modern photography. Students will be exposed to photojournalism - documentary, editorial, narrative and editing - as well as explorations of current career possibilities. Lectures, critiques, demonstrations and assignments will provide participants the opportunity to explore the still, audio, and multimedia strategies used for story telling in this era. Students will be expected to meet tight project deadlines and participate in both class discussions, critiques and practices required to be successful in this field. If you are pursuing the Photojournalism option this course is required. (Prerequisites: PHPS-102 or PHAR-102 or PHAR-161 or equivalent course.) **Lab 3, Credits 3 (Fall, Spring, Summer)**

PHAR-203**Elements of Photojournalism**

This course will serve an introduction to visual story telling as it relates to professional photojournalism. It will provide relevant practice in basic technical, compositional and interpersonal skills necessary in all aspects of modern photography. Students will be exposed to photojournalism - documentary, editorial, narrative and editing - as well as explorations of current career possibilities. Lectures, critiques, demonstrations and assignments will provide participants the opportunity to explore the still, audio, and multimedia strategies used for story telling in this era. Students will be expected to meet tight project deadlines and participate in both class discussions, critiques and practices required to be successful in this field. If you are pursuing the Photojournalism option this course is required. (Prerequisites: PHPS-102 or PHAR-102 or PHAR-161 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring, Summer)**

PHAR-204**Elements of Visual Media**

This course will provide an introduction to the professional opportunities where the fields of photography, graphic design and print media overlap. Students will develop an understanding of the working relationships between professionals involved in each of the three career areas. Successful visual media experts require a contemporary understanding of the business practices necessary to manage the workflow, financial operations and personnel necessary for success. Students in this class will experience the breadth of interactions between these three career paths, and appreciate the management necessary in their dynamic relationships. Students pursuing the Visual Media option are required to take this course. (Prerequisites: PHPS-102 or PHAR-102 or PHAR-161 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

PHAR-207**Technology and Image Making**

Changing technology continues to influence how photographers capture, modify, distribute, and consume images. This course will emphasize the development of artistic voice in the context of this evolving climate. By further mastering craft, students will gain experience in using technology to expand what is possible in the photographic image, both technically and creatively. Course topics will include photographic creativity, image capture, optimization, construction, manipulation, and distribution. Proficiency in new technologies will push boundaries of image making, augment a visual vocabulary, and expand creative expression. (Prerequisites: PHAR-102 or equivalent course.) **Lab 5, Credits 3 (Fall, Spring)**

PHAR-211**Histories and Aesthetics of Photography I**

The objective of this course, part one of a two semester sequence, is to present an overview of the multiple, intersecting histories and aesthetic practices of photography as utilized for fine art, snapshot, documentary, scientific, commercial and propaganda purposes in a global perspective. Course lectures include the medium's pre-history and a detailed development of the camera obscura. Students will learn about many technical processes, as well as, the multiple interpretations of notable images during the period 1800-1915. **Lecture 3, Credits 3 (Fall, Summer)**

PHAR-212**Histories and Aesthetics of Photography II**

The objective of this course, the second course of a two-semester sequence, is to present an overview of the multiple, intersecting histories and aesthetic practices of photography from the development of Modernism to the present, including the medium's transformation by digital imaging in the 21st century. Photography's applications within fine art, documentary, scientific, journalistic, commercial and vernacular practices will be investigated within a global perspective, but primary emphasis is placed upon developments and movements within the United States and Europe. **Lecture 3, Credits 3 (Spring, Summer)**

PHAR-241**Advanced Video for Photographers**

This course will further develop skills sets explored in the Foundations 4D Design course by introducing students to advanced techniques for shooting, lighting, color correction, audio formats, and multi-channel or multi camera editing, short-form moving media creation. The course will also explore the use of kinetic text, shape layers, and introduce the incorporation of 3D modeling into 2D video projects. Students will consider work by contemporary media creators as they plan and execute their own video projects. Upon completion of the course, students will have a deeper understanding of the skills necessary to create their own professional level video projects. (Prerequisites: FDTN-141 or equivalent course.) **Lab 6, Credits 3 (Fall or Spring)**

PHAR-278**Capture to Output**

This course is designed for students who know the basics in photographic workflow and want to build their skillset to easily move between all aspects of ideation, image capture, optimization, post-production, image management, and output. An emphasis will be placed on the development of artistic voice in the context of this evolving climate. Proficiency in current and new technologies will push the boundaries of image-making, augment a visual vocabulary, and expand creative expression for the successful distribution and consumption of images. (Prerequisites: PHAR-102 or equivalent course.) **Lab 6, Credits 3 (Spring)**

PHAR-352

PhotoWkshp:

This course will focus on implementing areas of special interest including new, advanced, and emerging visual communication course content. Potential topics include any area in industry practices, business and creativity, visual communications, studio and location lighting, production, editorial photography and documentary storytelling. This course can be taken multiple times but individual topics must be different. **Lecture 1, Credits 1 (Fa/sp/su)**

PHAR-357

Personal Projects

Professional photographers traditionally make imagery solely for specific projects and clients, which often constitute their entire body of work. In today's world, those hiring professional photographers expect to see work of an individual nature that reflect personal interests and/or viewpoints. Students will identify a topic/subject to create a body of personal work. Historical and contemporary examples of extended photographic projects will be viewed and discussed. Output, display and installation options will require extensive research as students articulate their project. The work will consist of the conceptualization, execution and presentation of long-term project(s). Students will be encouraged to explore concepts and outcomes extensively through contemporary photography as well as related media will be welcomed and encouraged. Students will present a final project formatted for appropriate display, based on their research and topic. (Prerequisites: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

PHAR-363

Black and White Photography I

This course, the first part of a two-semester sequence, will introduce students to the exposure and development of black and white film and the procedures for making high quality black and white photographic prints in a traditional darkroom with chemicals, safe lights and enlargers. Included in this course are 35mm, medium and large-format cameras, variables in making fine black and white prints and techniques for archival and museum quality processes and methods of display. Students must have access to a film camera with adjustable exposure controls. Each student will produce a finished portfolio of black and white fine prints. (Prerequisites: PHAR-101 or PHAR-160 or equivalent course.) **Lab 4, Credits 3 (Fall, Spring)**

PHAR-363

Black and White Photography I

This course, the first part of a two-semester sequence, will introduce students to the exposure and development of black and white film and the procedures for making high quality black and white photographic prints in a traditional darkroom with chemicals, safe lights and enlargers. Included in this course are 35mm, medium and large-format cameras, variables in making fine black and white prints and techniques for archival and museum quality processes and methods of display. Students must have access to a film camera with adjustable exposure controls. Each student will produce a finished portfolio of black and white fine prints. (Prerequisites: PHAR-101 or PHAR-160 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring)**

PHAR-364

Black and White Photography II

This course, the second course of a two-semester sequence, will introduce students to the use and manipulation of specialty analog cameras (pinhole, Holga, Hasselblad fish-eye, X-Pan, view camera, etc.) and include information and exercises using the Zone System. In addition to the hardware resources, the course will survey and demonstrate methods of making "monoprints" - one of a kind photographs using analog processes such as photogram, chemogram, wet plate ambrotype, and hand-coloring. Students will also interpret selections of work by noted photographic artists and others enrolled in the course in both critiques and written assignments. A creative portfolio of black and white prints and/or monoprints will be produced by each student. (Prerequisites: PHAR-150 or PHAR-363 or equivalent course.) **Lab 4, Credits 3 (Spring)**

PHAR-364

Black and White Photography II

This course, the second course of a two-semester sequence, will introduce students to the use and manipulation of specialty analog cameras (pinhole, Holga, Hasselblad fish-eye, X-Pan, view camera, etc.) and include information and exercises using the Zone System. In addition to the hardware resources, the course will survey and demonstrate methods of making "monoprints" - one of a kind photographs using analog processes such as photogram, chemogram, wet plate ambrotype, and hand-coloring. Students will also interpret selections of work by noted photographic artists and others enrolled in the course in both critiques and written assignments. A creative portfolio of black and white prints and/or monoprints will be produced by each student. (Prerequisites: PHAR-150 or PHAR-363 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

PHAR-370

City as Site: Dubai and Beyond

This course offers students in College of Art and Design and at RIT the opportunity to travel to RIT Dubai in the United Arab Emirates. Students will create work inspired by an unfamiliar locale, (culture, people, place, geography) while having the opportunity to explore Dubai and the other city/states of the Emirates. This course is focused on the understanding of place and the conceptual development of a creative project as it relates to a specific locale. This course is not photography specific and is open to disciplines across the college and campus. The final project may include photography, film, visual projection, or design. (This course requires permission of the Instructor to enroll.) **Lecture 3, Credits 3 (Spring)**

PHAR-386

Multimedia Arts: Topic

Multimedia Arts Workshop will situate multimedia arts within related global, social, historical, and theoretical perspectives. As a special topics shell course, students will use critical thinking and analysis toward the development of skills in multimedia arts. Potential topics include: motion graphics, animation, 360 immersive video, cinematography, documentary art, interactivity, etc. This course may be repeated, topics may not. (This course is available to RIT degree-seeking undergraduate students.) **Lab 3, Credits 3 (Fall or Spring)**

PHAR-386

Multimedia Arts: Topic

Multimedia Arts Workshop will situate multimedia arts within related global, social, historical, and theoretical perspectives. As a special topics shell course, students will use critical thinking and analysis toward the development of skills in multimedia arts. Potential topics include: motion graphics, animation, 360 immersive video, cinematography, documentary art, interactivity, etc. This course may be repeated, topics may not. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 2, Credits 3 (Fall or Spring)**

PHAR-399

Photographic Arts Part-Time Co-op

Cooperative Education will provide photographic and imaging arts students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in PHIMAG-BFA, PHTILL-BFA or VISMED-BFA with at least 2nd year standing and department permission.) **CO OP, Credits 0 (Fall, Spring, Summer)**

PHAR-498

Photography Internship

The Photography Internship will provide students with the option to work in the photographic or visual communications field. Students may apply for internships to businesses based on the availability of positions and business job needs. Students must obtain permission of an instructor and complete the Internship Permission Form to enroll. (Prerequisites: This class is restricted to students in PHIMAG-BFA, PHTILL-BFA or VISMED-BFA with at least 2nd year standing and department permission.) **Internship, Credits 1 - 3 (Fall, Spring, Summer)**

PHAR-499

Photographic Arts Co-op

Cooperative Education will provide photographic and imaging arts students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (Prerequisites: This class is restricted to students in PHIMAG-BFA, PHTILL-BFA or VISMED-BFA with at least 2nd year standing and department permission.) **CO OP, Credits 0 (Fall, Spring, Summer)**

PHAR-560

Photography in Cuba Trip

This course will offer students the unique opportunity to participate in an immersive educational experience while traveling and photographing in Cuba. Through the use of photography, related field trips and lectures, this course will introduce students to a new culture and environment. Students will be exposed to challenges found in available light situations where they will photograph environments, architecture, and the people of Cuba. A final portfolio will illustrate effective visual documentation of Cuban culture. (Enrollment in this course requires permission from the department offering the course.) **Lab 2, Credits 3 (Spring)**

PHAR-560

Photography in Cuba Trip

This course will offer students the unique opportunity to participate in an immersive educational experience while traveling and photographing in Cuba. Through the use of photography, related field trips and lectures, this course will introduce students to a new culture and environment. Students will be exposed to challenges found in available light situations where they will photograph environments, architecture, and the people of Cuba. A final portfolio will illustrate effective visual documentation of Cuban culture. (Enrollment in this course requires permission from the department offering the course.) **Lecture 2, Credits 3 (Spring)**

PHAR-599

Photography Independent Study

Photography Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser, will propose a course of study. Photography Independent Study students must obtain permission of an instructor and complete the Independent Study Permission Form to enroll. (Prerequisites: This class is restricted to students in PHIMAG-BFA, PHTILL-BFA or VISMED-BFA with at least 2nd year standing and instructor permission.) **Ind Study, Credits 1 - 3 (Fall, Spring, Summer)**

Advertising Photography

PHAP-301

Advertising Photography I

This is the first of a sequence of required advertising photography courses that investigates visual problem solving when applied to commercial photography. Studio and other controlled environments will be encountered through assignments. Advertising and editorial solutions and applications will be explored. The skills necessary to photograph people, places, and things will be learned through various assignments. (Prerequisites: PHAR-202 and (PHAR-201 or PHAR-203 or PHAR-204) or equivalent courses.) **Lab 3, Credits 3 (Fall)**

PHAP-301

Advertising Photography I

This is the first of a sequence of required advertising photography courses that investigates visual problem solving when applied to commercial photography. Studio and other controlled environments will be encountered through assignments. Advertising and editorial solutions and applications will be explored. The skills necessary to photograph people, places, and things will be learned through various assignments. (Prerequisites: PHAR-202 and (PHAR-201 or PHAR-203 or PHAR-204) or equivalent courses.) **Lecture 2, Credits 3 (Fall)**

PHAP-302

Advertising Photography II

Building on the content delivered in Advertising Photography I, Advertising Photography II will introduce business aspects involved in commercial photography. Students will create self-promotion materials as well as a resume/cover letter. A cohesive portfolio is required at the end of the course. Students will also work on a group project, introducing them to the collaborative nature of the advertising business. Assignments will emphasize conceptual over technical solutions. (Prerequisites: PHAP-301 or equivalent course.) **Lab 3, Credits 3 (Spring)**

PHAP-302

Advertising Photography II

Building on the content delivered in Advertising Photography I, Advertising Photography II will introduce business aspects involved in commercial photography. Students will create self-promotion materials as well as a resume/cover letter. A cohesive portfolio is required at the end of the course. Students will also work on a group project, introducing them to the collaborative nature of the advertising business. Assignments will emphasize conceptual over technical solutions. (Prerequisites: PHAP-301 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

PHAP-306

The Collaborative Composite Image

Computer generated imaging (CGI) combined with photography is being widely used in commercial advertising. This course will offer photography students an opportunity to work in collaboration with computer graphic students by developing projects that seamlessly unite photography with CGI. Students will study work being generated professionally and develop their own projects as a team. A team approach will be employed to design, execute and integrate images for use in a commercial photography context. (Prerequisites: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

PHAP-306

The Collaborative Composite Image

Computer generated imaging (CGI) combined with photography is being widely used in commercial advertising. This course will offer photography students an opportunity to work in collaboration with computer graphic students by developing projects that seamlessly unite photography with CGI. Students will study work being generated professionally and develop their own projects as a team. A team approach will be employed to design, execute and integrate images for use in a commercial photography context. (Prerequisites: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent course.) **Studio 2, Credits 3 (Fall)**

PHAP-308

Location Photography

The course will cover the technical and aesthetic decisions necessary to produce successful photographs on location for both advertising and editorial usage. Students will be encouraged to develop a consistent personal style and maintain rigorous technical photographic standards. Students will explore a variety of subject matter while photographing on location. A final portfolio will be required for the course. (Prerequisites: PHAR-202 and (PHAR-201 or PHAR-203 or PHAR-204) or equivalent courses.) **Studio 5, Credits 3 (Fall)**

PHAP-311

Photographing People

An advanced study of people photography, this course will focus on the development of the photographic and social skills of the commercial photographer. This course will examine the effects of light, camera choice, and subject pose on reproducing the human form as a photograph. The student will learn to develop strategies for photographing people, build upon lighting skills, and improve photographic styling techniques. Casting and directing models, as well as the role of a professional photographic team will be included in the lectures, demonstrations, and assignments. (Prerequisites: PHAR-202 and (PHAR-201 or PHAR-203 or PHAR-204) or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

PHAP-312

Projects in Still Life Photography

This course will explore the genre of the still life as a subject in advertising and editorial photography. Students will examine a variety of forms of photographic expression as well as solve visual problems related to the still life image. The construction of the still life photograph and the effective use of props and backgrounds are important aspects of the course. (Prerequisites: PHAR-202 and (PHAR-201 or PHAR-203 or PHAR-204) or equivalent courses.) **Lecture 1, Credits 3 (Spring)**

PHAP-312

Projects in Still Life Photography

This course will explore the genre of the still life as a subject in advertising and editorial photography. Students will examine a variety of forms of photographic expression as well as solve visual problems related to the still life image. The construction of the still life photograph and the effective use of props and backgrounds are important aspects of the course. (Prerequisites: PHAR-202 and (PHAR-201 or PHAR-203 or PHAR-204) or equivalent courses.) **Studio 3, Credits 3 (Spring)**

PHAP-313

Editorial Photography

This course will explore the role of photography and design in contemporary magazines as well as online content. Students will have the option of working with still life, people, location, documentary, and architecture or fashion photography. Current events will be discussed for picture possibilities. Emphasis will be placed on producing multiple or sequential images that relate to social and political issues. Historical and contemporary studies of layout and style will be examined. A professional quality magazine featuring work done by all students will be produced. All projects will be done in collaboration with students in the graphic design major in the School of Design. (Prerequisites: PHAP-301 or equivalent course.) **Studio 5, Credits 3 (Fall, Spring)**

PHAP-314

Lighting Control and Manipulation

The course will provide an opportunity for experimentation with photographic light and its manipulation in a variety of situations both in and out of the studio. Assignments will range from simple portraits in the studio to complex locations, from simple still life set ups to intricate sets with groups of people. Methods of controlling a variety of lighting devices, both strobe and continuous-source, will be demonstrated and discussed. (Prerequisites: PHAR-202 and (PHAR-201 or PHAR-203 or PHAR-204 or PHPS-201 or PHPS-202) or equivalent courses.) **Studio 5, Credits 3 (Fall, Spring)**

PHAP-320

XL: Summer Ad Core

This course will provide students with the flexibility of using one studio for the entire course, allowing students to work as a professional photographer would. Students will work on self-assigned long-term projects with the goal of expanding their portfolio. A cohesive body of work is required at the end of the course. (Prerequisites: PHAR-202 and (PHAR-201 or PHAR-203 or PHAR-204) or equivalent courses.) **Lec/Lab 7, Credits 3 (Summer)**

PHAP-321

Industry Practices for Professional Photographers

Industry Practices for Professional Photographers, will provide advertising photography students with an in- depth understanding of the practices and principles of the photographic business world. Through lectures (which include guest speakers), the class will cover entry-level jobs, licensing/copyright, estimating/pricing, insurance, taxes, the breadth of industry jobs and marketing a small business. Also included will be interviewing strategies and implementing changes in career paths for students interested in pursuing a career in advertising photography. (Prerequisites: PHAP-302 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

PHAP-326

Architectural Photography

An image-making course for advanced photography students with a specific interest in architectural exterior and interior photography. Assignments will emphasize the development and exploration of professional techniques and styles. Class hours will include lecture-demonstration, discussion, critique, and both individual and group location work. All work will utilize digital capture methods. This is a non-laboratory, shooting course. (Prerequisites: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

PHAP-327

Fashion Photography

This course will introduce students to fashion photography and will look at fashion from a broad imaging perspective. There will be instruction on lighting, styling, and directing a fashion image, as well as developing concepts for photo shoots. Casting, studio and location practices, ethics, and the history of fashion photography will be addressed. Retouching of fashion photographs will be demonstrated. (Prerequisites: PHAR-202 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

PHAP-328

Food Photography

This course will examine the current trends in food photography used in advertising and editorial uses. There will be discussions and conversations with industry professionals on the techniques of food preparation, staging, styling, and specialized lighting techniques to help students create a portfolio of images for the food industry as well as discover the varied opportunities of working within this industry. (Prerequisites: PHAP-301 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

College of Art and Design

PHAP-336

Photo Illustration

This course will focus on the nature of the photographic fictions. Students will work on specific assignments, many of which will be generated from aspects of the history of photography. Lighting techniques are examined to create effective photographs. Digital post-production is discussed as a means to enhance the images as required by the assignments. (Prerequisites: PHAP-301 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

PHAP-337

Production Photography

This course will introduce the storytelling side of professional photographic illustration. Assignments for this course will include recreating historical events, inventing futuristic scenes, and creating believable period pieces with an emphasis on visual narratives. Students will be introduced to project planning, concept development, scheduling, budgeting, casting, auditions, advanced lighting techniques, comprehensive preparation for large production, project management and post-production treatments. Students work on production teams to address large-scale photographic projects. (Prerequisites: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

PHAP-337

Production Photography

This course will introduce the storytelling side of professional photographic illustration. Assignments for this course will include recreating historical events, inventing futuristic scenes, and creating believable period pieces with an emphasis on visual narratives. Students will be introduced to project planning, concept development, scheduling, budgeting, casting, auditions, advanced lighting techniques, comprehensive preparation for large production, project management and post-production treatments. Students work on production teams to address large-scale photographic projects. (Prerequisites: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent course.) **Studio 3, Credits 3 (Spring)**

PHAP-350

Topics in Advertising Photo

Photography (and photographic education) is in a perpetual state of flux due to constant changes in practices and technology. Topics in advertising photography will provide students with the opportunity to explore this shifting terrain of photography and imaging. The content taught in this course will change frequently and the course may be repeated for credit, however each particular topic may have limits on repeatability. (Prerequisites: PHAR-202 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

PHAP-351

Studio Topics in Advertising Photo

Advertising photography (and photographic education) is in a perpetual state of flux due to constant changes in practices and technology. Studio Topics in Advertising photography will provide students with the opportunity to explore studio applications in this shifting terrain of photography, imaging and application. The content taught in this course will change frequently and the course may be repeated for credit, however each particular topic may have limits on repeatability. (Co-requisite: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent course.) **Lab 3, Credits 3 (Fall, Spring)**

PHAP-351

Studio Topics in Advertising Photo

Advertising photography (and photographic education) is in a perpetual state of flux due to constant changes in practices and technology. Studio Topics in Advertising photography will provide students with the opportunity to explore studio applications in this shifting terrain of photography, imaging and application. The content taught in this course will change frequently and the course may be repeated for credit, however each particular topic may have limits on repeatability. (Co-requisite: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring)**

PHAP-361

Retouch and Restore

This course will explore the techniques, tools, practices, and workflows used in image restoration and retouching. We will begin with historical images to practice basic retouching and restoration techniques. We will then apply these skills to contemporary images and discuss the importance of the collaborative role of the image-maker and the re-toucher. One of the primary goals is to help students craft a personal or signature imaging style as well as looking at image retouching as an important skill set for career options. (Prerequisites: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent course.) **Lab 5, Credits 3 (Fall)**

PHAP-366

Advanced Retouching and Compositing

In this course we will begin where the retouching and restoration class left off. Building on the foundation of those techniques, we will delve deeper into the software tools and more advanced workflows used in image restoration, retouching and compositing. Once the retouching and restoration techniques have been mastered, we will transition into collage and montage building. This will include working with multiple images in single or multiple frames. We will expand the discussion of the collaborative roles of the image maker and the retoucher in relation to creating composite images. (Prerequisites: PHAP-361 or equivalent course.) **Lab 5, Credits 3 (Spring)**

PHAP-368

Interactive Music Video Experiences

This interdisciplinary course is designed for College of Art and Design and Golisano College of Computing and Information Sciences students to work in collaboration to produce a semester long interactive music project. The students will work with upcoming young musicians in the Rochester area in teams consisting of programmers, designers, CG artists, photographers, and filmmakers, depending on class enrollment. The students will examine how digital technology is changing the way we experience and consume music. Students are introduced to the resources and tools necessary to produce an interactive music experience while working with professional musicians. (Prerequisites: This course is restricted to students in CAD or GCCIS with at least 3rd year student standing.) **Lab 2, Credits 3 (Fall)**

PHAP-368

Interactive Music Video Experiences

This interdisciplinary course is designed for College of Art and Design and Golisano College of Computing and Information Sciences students to work in collaboration to produce a semester long interactive music project. The students will work with upcoming young musicians in the Rochester area in teams consisting of programmers, designers, CG artists, photographers, and filmmakers, depending on class enrollment. The students will examine how digital technology is changing the way we experience and consume music. Students are introduced to the resources and tools necessary to produce an interactive music experience while working with professional musicians. (Prerequisites: This course is restricted to students in CAD or GCCIS with at least 3rd year student standing.) **Lecture 2, Credits 3 (Fall)**

PHAP-403

Portfolio Development

This course is required for advertising photography students who are approaching graduation and are preparing to present themselves to potential employers. Students will narrow their field of interests to focus their work for an end-of-study portfolio. Existing and new work will be edited, sequenced and prepared to form a professional quality portfolio, promotional materials, a resume/cover letter, a market research paper and a business plan. (Prerequisites: PHAP-302 or equivalent course and completion of First Year Writing (FYW) requirement.) **Lecture 3, Credits 3 (Spring)**

PHAP-411

Advertising and Design Photography

This course will pair students in advertising photography with students in graphic design to produce advertising-related projects. Teams will produce advertising campaigns that merge graphic design, photography, and copy. Contemporary and historical examples of advertising imagery will be studied. The ethics and business of advertising photography will be studied through lectures, discussions, and field trips. (Prerequisites: PHAP-302 or equivalent course.) **Studio 5, Credits 3 (Spring)**

PHAP-416

New York City Advertising Photography Field Trip

This course provides photography students the unique opportunity to participate in a one-week intensive workshop that travels to New York City, the center of the advertising photography industry. Through this field trip and accompanying lectures and studio visits, students will experience an introduction to the field of professional photography and related industries in New York City. The purpose of the trip is to provide a broad view of advertising and editorial photography within the city. Students meet with a variety of photographers, art directors, designers, filmmakers, photo editors, photographer agents, assistants, and RIT alumni. Photography studios, advertising agencies, graphic design studios, magazines, galleries, and museums will be visited during the one-week trip. Permission to enroll is required. The trip is a mandatory course requirement and requires an additional travel fee. (Prerequisites: PHAP-301 or equivalent course.) **Lecture 1, Credits 3 (Fall)**

Fine Art Photography

PHFA-301

Fine Art Core I

This course is the first in a sequence of two principle critique and production classes for students in the fine art photography option of the BFA program. Students will undertake conceptually-driven assignments to investigate their ideas through a critical engagement with peers within the context of contemporary photographic practices. (Prerequisites: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent courses.) **Lecture 4, Credits 3 (Fall)**

PHFA-302

Fine Art Core II

This course is the second in a sequence of two principle production and critique classes for students in the fine art photography option of the BFA program. Each student will analyze, interpret and develop a meaningful practice to create personal artwork. Course emphasis requires students to produce a contemporary photographic-based independent body of work and demonstrate best practices within the fine arts. (Prerequisites: PHFA-301 or equivalent course.) **Lecture 4, Credits 3 (Spring)**

PHFA-350**Topics in Fine Art Photography**

Photography (and photographic education) is in a perpetual state of flux due to constant changes in practices and technology. Topics in fine art photography will provide students with the opportunity to explore this shifting terrain of photography and imaging related to personal exploration and self-expression. The content taught in this course will change frequently and the course may be repeated for credit, however each particular topic may have limits on repeatability. (Prerequisites: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

PHFA-351**Studio Topics in Fine Art Photography**

Photography (and photographic education) is in a perpetual state of flux due to constant changes in practices and technology. Studio Topics in Fine Art Photography will provide students with the opportunity to explore studio applications in this shifting terrain of photography and imaging. The content taught in this course will change frequently and the course may be repeated for credit, however each particular topic may have limits on repeatability. (Prerequisite: Successful completion of two of the following courses is required PHAR-201, PHAR-202, PHAR-203 or PHAR-204.) **Lab 3, Credits 3 (Fall, Spring)**

PHFA-351**Studio Topics in Fine Art Photography**

Photography (and photographic education) is in a perpetual state of flux due to constant changes in practices and technology. Studio Topics in Fine Art Photography will provide students with the opportunity to explore studio applications in this shifting terrain of photography and imaging. The content taught in this course will change frequently and the course may be repeated for credit, however each particular topic may have limits on repeatability. (Prerequisite: Successful completion of two of the following courses is required PHAR-201, PHAR-202, PHAR-203 or PHAR-204.) **Lecture 2, Credits 3 (Fall, Spring)**

PHFA-359**The Constructed Image**

This course will introduce students to the concept, theory, and practice of constructed imagery within the context of contemporary photography. Image making will be explored from creating interventions within the landscape to the manipulation of space in and out of studio spaces as a method of creating photographs. Participants will be introduced to the history of constructed imagery and the impact this working methodology has towards the contemporary dialog in photography. (Prerequisites: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring)**

PHFA-359**The Constructed Image**

This course will introduce students to the concept, theory, and practice of constructed imagery within the context of contemporary photography. Image making will be explored from creating interventions within the landscape to the manipulation of space in and out of studio spaces as a method of creating photographs. Participants will be introduced to the history of constructed imagery and the impact this working methodology has towards the contemporary dialog in photography. (Prerequisites: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent course.) **Studio 3, Credits 3 (Fall, Spring)**

PHFA-365**Art and the Internet**

This course will investigate the use of the internet by artists as a means of distributing their work, creating an audience, engaging in multidisciplinary practices and, most importantly, conceptualizing work for an interactive, web-based interface utilizing current technologies. Students will learn how to design, publish and maintain web sites as an online exhibition of their work. Students will learn to publish still images, video and other digital media. Supported by critical and theoretical writings published since the advent of digital imaging and the internet, we will examine what it means for artists to create work for a potentially unlimited audience that operates outside of the traditional museum/gallery/object-oriented distribution network. (This course is available to RIT degree-seeking undergraduate students.) **Lab 3, Credits 3 (Fall, Spring)**

PHFA-365**Art and the Internet**

This course will investigate the use of the internet by artists as a means of distributing their work, creating an audience, engaging in multidisciplinary practices and, most importantly, conceptualizing work for an interactive, web-based interface utilizing current technologies. Students will learn how to design, publish and maintain web sites as an online exhibition of their work. Students will learn to publish still images, video and other digital media. Supported by critical and theoretical writings published since the advent of digital imaging and the internet, we will examine what it means for artists to create work for a potentially unlimited audience that operates outside of the traditional museum/gallery/object-oriented distribution network. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 2, Credits 3 (Fall, Spring)**

PHFA-401**Professional Development for Artists**

This class will prepare the advanced student for a career in the arts. It will cover practical information related to required professional practices such as the creation and maintenance of a professional website, creating a portfolio, resume writing, grant writing, writing an artist's statement, researching exhibition spaces, and self-publishing. Students will undertake research and apply for professional opportunities. The course addresses the role of the artist in society, and includes visits with artists and museum and gallery professionals. (Prerequisites: (PHAR-201 and (PHAR-202 or PHAR-203 or PHAR-204)) or STAR-311 and completion of First Year Writing (FYW) requirement.) **Lecture 3, Credits 3 (Fall, Spring)**

PHFA-402**Fine Art Photo Portfolio I**

This course represents part one of two parts of the culmination of the studio/critique experience for students in Fine Art Photography. Having established a working artistic methodology in previous courses, students will begin to consolidate a final body of work through the critical engagement with their peers and faculty. The focus of the course is to create works for the Senior Exhibition during spring semester in the Fine Art Portfolio II course. Studio practices and extensive critique experiences are featured in this course. (Prerequisites: PHFA-302 or equivalent course.) **Lecture 4, Credits 3 (Fall, Spring)**

PHFA-403**Fine Art Photography Portfolio II**

This course represents the final culmination of the studio/critique experience for students in fine art photography. Having established a working artistic methodology in the previous fine art courses, students will consolidate a final body of work through the critical engagement with their peers and faculty. The focus of the course will lead to the senior exhibition and the completion of a printed portfolio or other final expression of their work such as video or installation. Studio practices creation of new artwork and extensive critique experiences are featured in this course. (Prerequisites: PHFA-402 or equivalent course.) **Lecture 4, Credits 3 (Spring)**

PHFA-511**Contemporary Issues**

A study of current issues relevant to imaging-based fine art photography and related media; how they relate to broader historical/cultural issues; and how they might suggest future directions. Emphasis is placed on the integration of critical theoretical discourse and studio practice. This course is a touchstone to current and future fine art practices through its engagement with a variety of subjects. This course can be taken multiple times but individual topics must be different. (Prerequisites: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

PHFA-531**New York City Fine Art Photography Field**

Fine art photography students in this class will have the unique opportunity to participate in a one-week intensive workshop that travels to New York City, arguably the center of the photography industry. During the field trip and accompanying lectures and studio/museum/gallery visits students will gain an immersive exposure to the field of fine art and applied photography and related its industries in New York City. Students will meet with a variety of photographers, art gallery directors, museum personnel, studio artists, assistants, and RIT alumni. Photography studios, magazines, galleries, and photo/art museums and universities will also be visited during the one-week field trip. (Prerequisites: PHFA-302 or equivalent course.) **Lecture 1, Credits 3 (Fall or Spring)**

PHFA-556**Moving Image and Contemporary Practices**

This course explores the history and evolution of the moving image in visual art. Students will utilize digital and analog imagery to create new work that expands on the disciplines of photography and video. Throughout this course, students will develop a body of diverse work that explores time-based art for production, installation, web-based and social media platforms. Exploring a wide range of video, digital imaging, projection, and photographic artists and methods, students will have an opportunity to integrate the moving image into their individual discipline and portfolio of work. Students will work with photographic processes, digital tools, mobile devices, editing and compositing software, and projection technologies to create and display work. Published writings and work by established artists are also read and discussed. (Prerequisite: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or FDTN-141 or equivalent course.) **Lab 3, Credits 3 (Fall, Spring)**

PHFA-556**Moving Image and Contemporary Practices**

This course explores the history and evolution of the moving image in visual art. Students will utilize digital and analog imagery to create new work that expands on the disciplines of photography and video. Throughout this course, students will develop a body of diverse work that explores time-based art for production, installation, web-based and social media platforms. Exploring a wide range of video, digital imaging, projection, and photographic artists and methods, students will have an opportunity to integrate the moving image into their individual discipline and portfolio of work. Students will work with photographic processes, digital tools, mobile devices, editing and compositing software, and projection technologies to create and display work. Published writings and work by established artists are also read and discussed. (Prerequisite: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or FDTN-141 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring)**

PHFA-562

The Fine Print Workflow

This course will discuss the latest advances in digital workflow, best practices and output technology. The emphasis will be on the creation of an optimal and efficient fine art print workflow with reproducible results. This will be achieved through the integration of the various software tools and technology at our disposal. Using these techniques, we will build optimized files and craft final, exhibition quality prints. The course content will cover various substrate options along with archival concerns and finishing. This course is intended to build on and update skills learned in previous photographic foundation courses. (Prerequisites: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent course.) **Lab 3, Credits 3 (Fall, Spring)**

PHFA-562

The Fine Print Workflow

This course will discuss the latest advances in digital workflow, best practices and output technology. The emphasis will be on the creation of an optimal and efficient fine art print workflow with reproducible results. This will be achieved through the integration of the various software tools and technology at our disposal. Using these techniques, we will build optimized files and craft final, exhibition quality prints. The course content will cover various substrate options along with archival concerns and finishing. This course is intended to build on and update skills learned in previous photographic foundation courses. (Prerequisites: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring)**

PHFA-565

Color Photography Seminar

This course is a creative exploration of the hybrid technology between traditional film-based color photography and digital imaging. Students will use film and progress through analog to digital conversion. Proper scanning techniques, information on proper color management and procedures for digital image editing and manipulation will be outlined. Various methods of printed output will be discussed and explored. Students will conceive and design their own photographic project and produce a portfolio of prints. (Prerequisites: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent course.) **Lab 3, Credits 3 (Fall, Spring)**

PHFA-565

Color Photography Seminar

This course is a creative exploration of the hybrid technology between traditional film-based color photography and digital imaging. Students will use film and progress through analog to digital conversion. Proper scanning techniques, information on proper color management and procedures for digital image editing and manipulation will be outlined. Various methods of printed output will be discussed and explored. Students will conceive and design their own photographic project and produce a portfolio of prints. (Prerequisites: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring)**

PHFA-576

Preservation Care of Photographs

This course will expose students to the field of photographic conservation and professional practices. Even in the digital era, millions of film and paper images are in greater need of preservation and conservation than at any point in history. This course will be co-listed with graduate students also interested in this topic. (This class is restricted to undergraduate students with at least 2nd year standing.) **Lecture 3, Credits 3 (Fall, Spring)**

Photojournalism

PHPJ-300

Study Abroad Topics in New Media Narratives

This course will allow students to work immersively in a foreign country putting into practice visual storytelling, language, human relations and reporting skills they have acquired up to date. In the course, students will study local/national cultural, social and/or environmental issues. Students will work as a collaborative team through the concept, planning, design and building of an interactive product (site, publication, and/or app). Because visual storytelling is in a perpetual state of flux as a result of constant changes in practices and technology, Study Abroad Topics in New Media Narratives will provide the opportunity to explore visual storytelling in this shifting terrain. The content taught in this course will change frequently and the course may be repeated for credit, however each particular topic may have limits on repeatability. (This course is restricted to RIT degree-seeking 3rd & 4th year honors majors or permission of instructor.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

PHPJ-302

Photojournalism I

This course will explore the use of the photographic image in narrative, documentary and editorial form. There will be an emphasis on publication, public need and independent projects. Lectures, critiques, demonstrations and assignments will provide participants the opportunity to explore the still, audio, video, and multimedia aspects of story telling. Students will be expected to meet project deadlines and participate in both class discussions and critiques. (Prerequisites: PHAR-203 or equivalent course.) **Lab 3, Credits 3 (Fall)**

PHPJ-302

Photojournalism I

This course will explore the use of the photographic image in narrative, documentary and editorial form. There will be an emphasis on publication, public need and independent projects. Lectures, critiques, demonstrations and assignments will provide participants the opportunity to explore the still, audio, video, and multimedia aspects of story telling. Students will be expected to meet project deadlines and participate in both class discussions and critiques. (Prerequisites: PHAR-203 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

PHPJ-306

Picture Editing I

This course focuses on image selection, usage and design. Using images from a variety of sources, we discuss picture selection relative to context and desired impact in print and online. Effective use of images for a variety of story applications are discussed. Design techniques that maximize impact and storytelling are investigated, including scaling, proportion, sequencing, visual variety and sizing. Students will design a number of assignments from single pages to multi-page essays of varying length. Students will design a number of single pages to multi-page essays for various publishing and storytelling platforms that include print, online, and mobile delivery. (Prerequisites: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent course.) **Lab 3, Credits 3 (Spring)**

PHPJ-306

Picture Editing I

This course focuses on image selection, usage and design. Using images from a variety of sources, we discuss picture selection relative to context and desired impact in print and online. Effective use of images for a variety of story applications are discussed. Design techniques that maximize impact and storytelling are investigated, including scaling, proportion, sequencing, visual variety and sizing. Students will design a number of assignments from single pages to multi-page essays of varying length. Students will design a number of single pages to multi-page essays for various publishing and storytelling platforms that include print, online, and mobile delivery. (Prerequisites: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

PHPJ-307

Ethics and Law

This course will introduce students to the principles and theories of ethics and their application to editorial photography and photojournalism for mass communications. It will establish a basic understanding of philosophical ethics, social responsibility, and professional practices within protections and responsibilities of the First Amendment. The course will also review the legal issues relating to photographic practices and access to subjects. The course will examine a wide range of case examples used in classroom discussion and analysis to build a foundation for professional practice. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 3, Credits 3 (Spring)**

PHPJ-310

Honors Studio Projects Topics in New Media Narratives

This course will provide students with the opportunity to work on a project putting into practice visual storytelling, human interactions, and research and reporting skills using a variety of mediums. In the process, students are exposed to regional/national cultural, social and/or environmental issues. Students will work in teams starting with concept development, planning, designing and building of an interactive product (site, publication, and/or app). Because visual storytelling is frequently changing because of new practices and technology, the Honors Studio Projects in New Media Narratives course will provide opportunities to produce new work in this shifting terrain. The content included in the course will frequently change and may be repeated for credit. (This course is restricted to RIT degree-seeking 3rd & 4th year honors majors or permission of instructor.) **Lab 3, Credits 3 (Fall, Spring)**

PHPJ-310

Honors Studio Projects Topics in New Media Narratives

This course will provide students with the opportunity to work on a project putting into practice visual storytelling, human interactions, and research and reporting skills using a variety of mediums. In the process, students are exposed to regional/national cultural, social and/or environmental issues. Students will work in teams starting with concept development, planning, designing and building of an interactive product (site, publication, and/or app). Because visual storytelling is frequently changing because of new practices and technology, the Honors Studio Projects in New Media Narratives course will provide opportunities to produce new work in this shifting terrain. The content included in the course will frequently change and may be repeated for credit. (This course is restricted to RIT degree-seeking 3rd & 4th year honors majors or permission of instructor.) **Lecture 2, Credits 3 (Fall, Spring)**

PHPJ-315

Non-Fiction Multimedia

This course will teach students how to tell stories in the digital world. Students will learn the skills necessary to gather and edit audio and how to combine audio, images, and text for compelling online storytelling. In addition to basic technical skills, the course will explore contemporary concepts for effective multimedia storytelling. (Prerequisites: PHAR-203 or equivalent courses.) **Lab 3, Credits 3 (Fall, Spring)**

PHPJ-315**Non-Fiction Multimedia**

This course will teach students how to tell stories in the digital world. Students will learn the skills necessary to gather and edit audio and how to combine audio, images, and text for compelling online storytelling. In addition to basic technical skills, the course will explore contemporary concepts for effective multimedia storytelling. (Prerequisites: PHAR-203 or equivalent courses.) **Lecture 2, Credits 3 (Fall, Spring)**

PHPJ-319**Multimedia Editing for PJ**

This course prepares students with multimedia editing skills. Students will use audio and video editing software to create multimedia projects with existing assets and adapt story-telling techniques for a variety of media. (Prerequisites: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent course.) **Lab 3, Credits 3 (Fall, Spring)**

PHPJ-319**Multimedia Editing for PJ**

This course prepares students with multimedia editing skills. Students will use audio and video editing software to create multimedia projects with existing assets and adapt story-telling techniques for a variety of media. (Prerequisites: PHAR-201 or PHAR-202 or PHAR-203 or PHAR-204 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring)**

PHPJ-350**PJ Topics:**

Photography (and photographic education) is in a perpetual state of flux due to constant changes in practices and technology. Topics in photojournalism will provide students with the opportunity to explore this shifting terrain of photography and imaging using contemporary problems. The content taught in this course will change frequently and the course may be repeated for credit, however each particular topic may have limits on repeatability. **Lecture 3, Credits 3 (Fall, Spring)**

PHPJ-351**PJ ST:**

Photography (and photographic education) is in a perpetual state of flux due to constant changes in practices and technology. Studio topics in photojournalism will provide students with the opportunity to explore studio applications in this shifting terrain of photography and imaging when applied to contemporary situations resident in this dynamic industry. The content taught in this course will change frequently and the course may be repeated for credit, however each particular topic may have limits on repeatability. **Lab 3, Credits 3 (Fall, Spring)**

PHPJ-351**PJ ST:**

Photography (and photographic education) is in a perpetual state of flux due to constant changes in practices and technology. Studio topics in photojournalism will provide students with the opportunity to explore studio applications in this shifting terrain of photography and imaging when applied to contemporary situations resident in this dynamic industry. The content taught in this course will change frequently and the course may be repeated for credit, however each particular topic may have limits on repeatability. **Lecture 2, Credits 3 (Fall, Spring)**

PHPJ-352**Mini-Workshop Topics**

This course will focus on implementing areas of special interest including new, advanced, and emerging visual communication course content. Potential topics may include areas in visual communications, video, visual storytelling, and documentary storytelling. Students may take more than one Mini-Workshop with different topics. **Lecture 1, Credits 1 (Fall, Spring)**

PHPJ-356**Alternate Influences**

This course introduces students to a wide range of disciplines that influence image making. Students will develop a new vocabulary for discussing their own work as well as the work of those who came before them. They will develop a respect, through knowledge and experience, for practitioners of other aesthetic disciplines - artistic, cultural, and others - with regards to photography and, specifically, photojournalism. Students will explore various forms of literary, cinematic, poetic, and lyrical storytelling as influences on photojournalism. (Prerequisites: PHAR-203 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

PHPJ-365**Survey of Documentary Photography**

This course will address historical, social, political, and ethical issues as they relate to documentary photography. Within its history, documentary photography has been seen as personal artistic expression, a form of anthropological research, a tool for social change and even propaganda. Documentary photography is frequently newsworthy, and selected images from more extensive projects have become a part of daily editorial and press coverage. Students will consider the different ways that documentary photography is translated into the contemporary media landscape and more importantly, they will analyze the ethical dimensions of the use of documentary today. **Lecture 3, Credits 3 (Fall, Spring)**

PHPJ-366**NYC Photojournalism Trip**

This course provides students the unique opportunity to participate in a one-week intensive workshop that travels to New York City, the center of the photojournalism business in the US. The purpose of the trip is to provide a broad view of documentary and editorial photography in the industry and give students an idea of the wide variety of potential job markets that exist for documentary/editorial work. Students will meet with a variety of photographers, art directors, designers, photo editors, photographer agents, including RIT alumni, while visiting print and online publications (magazines and newspapers), photo agencies, photography studios, galleries, and museums. **Note: A special course fee will be assessed ** (Co-requisite: PHPJ-302 or equivalent course.) **Lecture 1, Credits 3 (Fall)**

PHPJ-375**Interactive Narrative Storytelling**

This course will enable students to develop a strong foundation in elements of web production including learning basic mark-up and programming languages commonly used in web development, UI/UX design, typography and content editing. Students will complete the course by working collaboratively with students in other art, design, photographic, digital humanities or visual storytelling courses to develop effective and innovative ways to display and narrate content in digital environments. Students will learn usability testing, how to prepare images and video for online environments as well as understanding the importance of storytelling on mobile devices. **Lab 3, Credits 3 (Fall, Spring)**

PHPJ-375**Interactive Narrative Storytelling**

This course will enable students to develop a strong foundation in elements of web production including learning basic mark-up and programming languages commonly used in web development, UI/UX design, typography and content editing. Students will complete the course by working collaboratively with students in other art, design, photographic, digital humanities or visual storytelling courses to develop effective and innovative ways to display and narrate content in digital environments. Students will learn usability testing, how to prepare images and video for online environments as well as understanding the importance of storytelling on mobile devices. **Lecture 2, Credits 3 (Fall, Spring)**

PHPJ-401**Photojournalism Capstone 1**

This is the first of a two-course capstone sequence for students in photojournalism. Students will create an independent senior capstone project proposal that also demands the student research. Students will have the support and guidance of a faculty member. The students will research and plan for the production of a visual media presentation, a book/hardcopy portfolio or a collaborative editing portfolio and a written statement and conclusion. Course will include weekly group presentations on various topics to include time management, research, planning, photographic and photojournalistic subjects. (Prerequisites: PHPJ-301 or equivalent course and completion of First Year Writing (FYW) requirement.) **Lab 5, Credits 3 (Fall)**

PHPJ-402**Photojournalism Capstone 2**

This course will explore career options, assess individual skills and temperament, and establishes initial and long-term career goals for each student. Students develop portfolios with an emphasis on their established goals. Issues in new media and forms of presentation are addressed, as well as building a professional life beyond the entry-level job. Job research, resume development, preparation, application and interviewing skills are incorporated into an examination of the changes in media publications and their use of photographers and photographic images. (Prerequisites: PHPJ-401 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

PHPJ-412**Photojournalism II**

This advanced course will explore and expand on the use of the photographic image in narrative, documentary and editorial form. The emphasis of the course will be on professional practices, professional visual storytelling, and publication. Lectures, critiques, demonstrations, and assignments will provide participants the opportunity to explore the still and multimedia aspects of storytelling. Students gain insight into the business of photojournalism and develop an awareness of career options available to them. Students are expected to meet project deadlines and participate in both class discussions and critiques. (Prerequisites: PHPJ-302 or equivalent course.) **Lab 3, Credits 3 (Spring)**

PHPJ-412**Photojournalism II**

This advanced course will explore and expand on the use of the photographic image in narrative, documentary and editorial form. The emphasis of the course will be on professional practices, professional visual storytelling, and publication. Lectures, critiques, demonstrations, and assignments will provide participants the opportunity to explore the still and multimedia aspects of storytelling. Students gain insight into the business of photojournalism and develop an awareness of career options available to them. Students are expected to meet project deadlines and participate in both class discussions and critiques. (Prerequisites: PHPJ-302 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

PHPJ-455**Advanced Non-fiction Multimedia**

This course will provide students with advanced multimedia techniques and introduces photographers to storytelling and reporting using still cameras with video and sound capture features. Students will research and produce multimedia work in class. (Prerequisites: PHPJ-315 or equivalent course.) **Lab 3, Credits 3 (Fall, Spring)**

PHPJ-455

Advanced Non-fiction Multimedia

This course will provide students with advanced multimedia techniques and introduces photographers to storytelling and reporting using still cameras with video and sound capture features. Students will research and produce multimedia work in class. (Prerequisites: PHPJ-315 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring)**

PHPJ-461

Working On Location

This course is designed to prepare students for on-location assignments, which includes planning and preparation for challenging photographic issues and conditions. Students will learn how to prepare for and address constituency issues, logistical issues, safety issues, and lighting problems. Additionally, students will work with image transmission and wireless remotes to address specific assignment needs and storytelling. (Prerequisites: PHPJ-302 or equivalent course.) **Lab 6, Credits 3 (Fall or Spring)**

PHPJ-461

Working On Location

This course is designed to prepare students for on-location assignments, which includes planning and preparation for challenging photographic issues and conditions. Students will learn how to prepare for and address constituency issues, logistical issues, safety issues, and lighting problems. Additionally, students will work with image transmission and wireless remotes to address specific assignment needs and storytelling. (Prerequisites: PHPJ-302 or equivalent course.) **Lecture 1, Credits 3 (Fall or Spring)**

PHPJ-465

Documentary II

This course explores the dialogue between images and texts in relation to lived experience. This course takes the introductory experiences from the course Documentary I and builds on those experiences to look more deeply at a single subject or issue. The course examines particular problems, challenges, and responsibilities of documentary work and representing the lives of others to an outside audience. This course approaches documentary work through case studies and field work, and requires students to apply theoretical readings and critiques of published documentary work to their own projects. (Prerequisites: PHPJ-365 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

PHPJ-466

DC Photojournalism Trip

This course provides photography students the unique opportunity to participate in a one-week intensive workshop that travels to Washington, D.C., the center of the photojournalism business outside of New York City. The purpose of the trip is to provide a broad view of documentary and editorial photography in the industry and give students an idea of the wide variety of potential job markets that exist for documentary/editorial work. Students will meet with a variety of photographers, photo editors, and designers, including RIT alumni, while visiting print and online publications (magazines and newspapers), governmental agencies, photo agencies, photography studios, galleries, and museums. **Fee: A special course fee will be assessed** (Prerequisites: PHPJ-302 or equivalent course.) **Lecture 1, Credits 3 (Fall)**

PHPJ-476

Picture Editing II

Picture Editing II is an advanced course designed for students to develop and express creative ideas, shape visual texts, and convey stories, concepts, and viewpoints through the understanding of image sequencing, and layout. Using images from a variety of sources, we discuss how to use images effectively in a variety of story applications and media. This course also emphasizes project management and managing assignments, photographers and editors. This is a non-shooting course, and students will work with existing professional images to develop visual narratives and essays in a variety of media. Students will study market segmentation, new audiences, new forms of content delivery, and other consequences associated with rapid changes in technology. Consideration is given to ongoing changes in professional photographic practice. Students will develop strategies for working in a professional environment. (Prerequisites: PHPJ-306 or equivalent course.) **Lab 3, Credits 3 (Fall, Spring)**

PHPJ-476

Picture Editing II

Picture Editing II is an advanced course designed for students to develop and express creative ideas, shape visual texts, and convey stories, concepts, and viewpoints through the understanding of image sequencing, and layout. Using images from a variety of sources, we discuss how to use images effectively in a variety of story applications and media. This course also emphasizes project management and managing assignments, photographers and editors. This is a non-shooting course, and students will work with existing professional images to develop visual narratives and essays in a variety of media. Students will study market segmentation, new audiences, new forms of content delivery, and other consequences associated with rapid changes in technology. Consideration is given to ongoing changes in professional photographic practice. Students will develop strategies for working in a professional environment. (Prerequisites: PHPJ-306 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring)**

PHPJ-523

Leadership in Creative Spaces

This course is designed for students from a variety of educational backgrounds, and will explore leadership skills required in collaborative, contemporary, and dynamic professional environments. Course content will cover the intersection and divergence of management and leadership concepts using large group discussions, small group activities, and self-reflective exercises. Students will identify their own personal leadership strengths and goals and develop management strategies used in modern business environments. Students will also incorporate ways to succeed in progressively challenging roles and learn methods for fostering inclusive environments. At the completion of this course, students will be able to leverage their personal and professional networks to create a diverse community of peers and collaborative partnerships that will lead to innovative work. **Lecture 3, Credits 3 (Spring)**

Photo Visual Media

PHVM-301

Visual Media Career Research

This course will introduce students to the practical methods for researching possible careers and opportunities after graduation. Using Internet and library research, students will identify a career field that might interest them. Further investigations will focus on the realities of working in that environment so that further decisions can be made leading to that career. This course is required for all 3rd year Visual Media majors. (Prerequisite: PHAR-204 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

PHVM-350

Topics in Visual Media

Photography (and photographic education) is in a perpetual state of flux due to constant changes in practices and technology. Topics in visual media will provide students with the opportunity to explore this shifting terrain of photography and imaging. The content taught in this course will change frequently and the course may be repeated for credit, however each particular topic may have limits on repeatability. (Prerequisite: Successful completion of two of the following courses is required PHAR-201, PHAR-202, PHAR-203 or PHAR-204.) **Lecture 3, Credits 3 (Fall, Spring)**

PHVM-351

Studio Topics in Visual Media

Photography (and photographic education) is in a perpetual state of flux due to constant changes in practices and technology. Studio Topics in Visual Media will provide students with the opportunity to explore studio applications in this shifting terrain of photography and imaging as applied to business and the graphic arts. The content taught in this course will change each frequently and the course may be repeated for credit, however each particular topic may have limits on repeatability. (Prerequisite: Successful completion of two of the following courses is required PHAR-201, PHAR-202, PHAR-203 or PHAR-204.) **Lab 3, Credits 3 (Fall, Spring)**

PHVM-351

Studio Topics in Visual Media

Photography (and photographic education) is in a perpetual state of flux due to constant changes in practices and technology. Studio Topics in Visual Media will provide students with the opportunity to explore studio applications in this shifting terrain of photography and imaging as applied to business and the graphic arts. The content taught in this course will change each frequently and the course may be repeated for credit, however each particular topic may have limits on repeatability. (Prerequisite: Successful completion of two of the following courses is required PHAR-201, PHAR-202, PHAR-203 or PHAR-204.) **Lecture 2, Credits 3 (Fall, Spring)**

PHVM-368

Visual Media Innovation Project

This course will challenge students to create novel visual media experiences using existing and emerging photographic and media technologies. Students may develop their work in partnership with individuals and organizations with interesting stories to tell or content to share with the public. Students will be taught how to make formal proposals for projects including workflows, timelines, and budgets. Students may work individually or in teams, depending on the scope and nature of their project. Final projects will be showcased at the end of the term. (Prerequisite: Successful completion of two of the following courses is required PHAR-201, PHAR-202, PHAR-203 or PHAR-204.) **Lecture 3, Credits 3 (Spring)**

PHVM-401

Visual Media Capstone

This course is the second required for all 4th year students in visual media and is the last required course in the curriculum. Students will be finalize their career preparation in anticipation of entry into the industry of choice. This course will require a major media project, allowing students to create a package/portfolio that represents their photographic, design, printing and management skills. (This course is restricted to PHIMAG-BFA, VISMED-BFA, PHVMEDIA or PHITLL-BFA students who have completed First-Year Writing.) **Lecture 3, Credits 3 (Spring)**

Imaging Systems

IMSM-301

Imaging Systems

This course will explore the technological fundamentals used in imaging systems. The course emphasizes the operation of devices/components used to optimize imaging systems. Fundamental concepts prevalent in imaging systems such as resolution, dynamic range, sensor architectures, printer and monitor technologies, color spaces, and image optimization workflows will be presented. Focus will be on the proper selection and underlying principles of these technologies and how to best apply that knowledge to solve problems in the imaging industry. Potential careers in the imaging industry will be presented throughout the course. (Prerequisite: PHPS-107 or SOFA-103 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

IMSM-302

Color Management Technology

This course, primarily designed for photographers, will provide students with hands on experience using software and hardware fundamental to contemporary practices in the imaging industry. It has been designed to expose students to a managed color workflow beginning at capture and culminating in output. The course will explore standard color instruments and give the essential knowledge and skills required to solve problems prevalent in the photographic field. Critical problem solving of accurate color reproduction across media will be investigated. (Prerequisites: IMSM-301 or equivalent course.) **Lab 3, Credits 3 (Spring)**

IMSM-302

Color Management Technology

This course, primarily designed for photographers, will provide students with hands on experience using software and hardware fundamental to contemporary practices in the imaging industry. It has been designed to expose students to a managed color workflow beginning at capture and culminating in output. The course will explore standard color instruments and give the essential knowledge and skills required to solve problems prevalent in the photographic field. Critical problem solving of accurate color reproduction across media will be investigated. (Prerequisites: IMSM-301 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

Photographic Sciences

PHPS-101

Photography I

This course is the first of a two-semester sequence exploring the fundamentals of photography, with emphasis on the development of strong photographic skills as they relate to the principles of DSLR cameras, lenses, choosing and using perspective, lighting and related aspects of photographic skills. Principles of creativity, craftsmanship, applied photographic theory and presentation will be used to solve visual communication problems. (This course is restricted to students in PHIMTEC-BS.) **Critique 3, Credits 4 (Fall)**

PHPS-101

Photography I

This course is the first of a two-semester sequence exploring the fundamentals of photography, with emphasis on the development of strong photographic skills as they relate to the principles of DSLR cameras, lenses, choosing and using perspective, lighting and related aspects of photographic skills. Principles of creativity, craftsmanship, applied photographic theory and presentation will be used to solve visual communication problems. (This course is restricted to students in PHIMTEC-BS.) **Lecture 1, Credits 4 (Fall)**

PHPS-101

Photography I

This course is the first of a two-semester sequence exploring the fundamentals of photography, with emphasis on the development of strong photographic skills as they relate to the principles of DSLR cameras, lenses, choosing and using perspective, lighting and related aspects of photographic skills. Principles of creativity, craftsmanship, applied photographic theory and presentation will be used to solve visual communication problems. (This course is restricted to students in PHIMTEC-BS.) **Lab 3, Credits 4 (Fall)**

PHPS-102

Photography II

This course is the second of a two-semester sequence of study further enhancing photographic practices. Emphasis is on improving photographic skills learned in Photography I. Skills include studio lighting, lighting on location, and macro photography. Principles of creativity, craftsmanship, and applied photographic theory will be used to support technical applications. (Prerequisites: PHPS-101 or PHAR-101 or equivalent course.) **Lab 3, Credits 4 (Spring, Summer)**

PHPS-102

Photography II

This course is the second of a two-semester sequence of study further enhancing photographic practices. Emphasis is on improving photographic skills learned in Photography I. Skills include studio lighting, lighting on location, and macro photography. Principles of creativity, craftsmanship, and applied photographic theory will be used to support technical applications. (Prerequisites: PHPS-101 or PHAR-101 or equivalent course.) **Studio 3, Credits 4 (Spring, Summer)**

PHPS-102

Photography II

This course is the second of a two-semester sequence of study further enhancing photographic practices. Emphasis is on improving photographic skills learned in Photography I. Skills include studio lighting, lighting on location, and macro photography. Principles of creativity, craftsmanship, and applied photographic theory will be used to support technical applications. (Prerequisites: PHPS-101 or PHAR-101 or equivalent course.) **Lecture 2, Credits 4 (Spring, Summer)**

PHPS-106

Photographic Technology I

This is the first in a two-course sequence that explores the technology of photography. This course demonstrates the application of physics, mathematics and optical science to the technology of image making. The course also provides the students with the opportunity to employ statistical data analysis to identify trends through laboratory exercises utilizing principles of scientific inquiry. Among the topics explored are the optics and physics of image formation, lens evaluation, light sources, digital light-sensitive materials, digital workflows, variability, quality control and photographic effects. **Lab 2, Credits 3 (Fall)**

PHPS-106

Photographic Technology I

This is the first in a two-course sequence that explores the technology of photography. This course demonstrates the application of physics, mathematics and optical science to the technology of image making. The course also provides the students with the opportunity to employ statistical data analysis to identify trends through laboratory exercises utilizing principles of scientific inquiry. Among the topics explored are the optics and physics of image formation, lens evaluation, light sources, digital light-sensitive materials, digital workflows, variability, quality control and photographic effects. **Lecture 2, Credits 3 (Fall)**

PHPS-107

Photographic Technology II

This is the second course in a two-semester course based in the study of the technology of photography, with emphasis on applications to real world photographic problems. Among the topics studied will include color vision, Munsell color system, CIELAB system, color theory, color management, digital color balance during post-processing, digital tone reproduction, and digital workflows. (Prerequisite: PHPS-106 or equivalent course.) **Lab 2, Credits 3 (Spring)**

PHPS-107

Photographic Technology II

This is the second course in a two-semester course based in the study of the technology of photography, with emphasis on applications to real world photographic problems. Among the topics studied will include color vision, Munsell color system, CIELAB system, color theory, color management, digital color balance during post-processing, digital tone reproduction, and digital workflows. (Prerequisite: PHPS-106 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

PHPS-201

Scientific Photography I

The first course of a two-semester sequence that will develop photographic skills and approaches required in scientific photography. The course will develop scientific methods required for standardized imaging. Appropriate subjects including contact lenses, rice grains and other challenging, nearly invisible objects will be explored. Students will investigate unique illumination techniques in order to reveal a subject's unusual characteristics. Techniques including polarized light and fluorescence reveal what cannot easily be observed without specialized photographic imaging and image processing. In addition, the course will expose students to ethical problems encountered in scientific imaging including managing and processing digital data. (Prerequisites: PHPS-102 or PHAR-102 or PHAR-161 or equivalent course.) **Lab 3, Credits 3 (Fall)**

PHPS-201

Scientific Photography I

The first course of a two-semester sequence that will develop photographic skills and approaches required in scientific photography. The course will develop scientific methods required for standardized imaging. Appropriate subjects including contact lenses, rice grains and other challenging, nearly invisible objects will be explored. Students will investigate unique illumination techniques in order to reveal a subject's unusual characteristics. Techniques including polarized light and fluorescence reveal what cannot easily be observed without specialized photographic imaging and image processing. In addition, the course will expose students to ethical problems encountered in scientific imaging including managing and processing digital data. (Prerequisites: PHPS-102 or PHAR-102 or PHAR-161 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

PHPS-202

Scientific Photography II

This is the second course in a two-semester sequence that explores new and different photographic skills and methods useful in scientific photography not covered in Scientific Photography I. Appropriate subjects will be explored in each of the various assignments designed to develop methods used in various scientific applications. Students will investigate new ways to reveal a subject's characteristics such as imaging with ultraviolet and infrared revealing what cannot be observed without photographic imaging and image processing. The course will expose students to the processes required to produce scientific research as well as scientific posters. (Prerequisites: PHPS-201 or equivalent course.) **Lab 3, Credits 3 (Spring)**

PHPS-202 **Scientific Photography II**
This is the second course in a two-semester sequence that explores new and different photographic skills and methods useful in scientific photography not covered in Scientific Photography I. Appropriate subjects will be explored in each of the various assignments designed to develop methods used in various scientific applications. Students will investigate new ways to reveal a subject's characteristics such as imaging with ultraviolet and infrared revealing what cannot be observed without photographic imaging and image processing. The course will expose students to the processes required to produce scientific research as well as scientific posters. (Prerequisites: PHPS-201 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

PHPS-207 **Vision, Perception and Imaging**
This course will explore the anatomical structure, function, and physiology of the human eye and brain and their relationship to vision, color, visual perception and imaging systems. The biology and physiology of the eye and psychology of visual perception will be explored. The concepts of depth perception in human vision as they relate to both two-dimensional and three-dimensional contexts will be examined. Relationships of image brightness, contrast and how visual processes lead to seeing will be addressed. **Lecture 3, Credits 3 (Spring)**

PHPS-211 **Photographic Optics**
This required course will investigate advanced photographic technology, with an emphasis on the study of the components of photographic imaging systems. Geometrical optics, color management, printing technologies and video standards will also be studied. Working in a lab environment, students will evaluate how technology can be optimized and where its limitations might be found. (Prerequisites: PHPS-107 or equivalent course.) **Lab 3, Credits 3 (Fall)**

PHPS-211 **Photographic Optics**
This required course will investigate advanced photographic technology, with an emphasis on the study of the components of photographic imaging systems. Geometrical optics, color management, printing technologies and video standards will also be studied. Working in a lab environment, students will evaluate how technology can be optimized and where its limitations might be found. (Prerequisites: PHPS-107 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

PHPS-217 **Media Production & Technology**
Media Technology explores the design, production and delivery of instructional media and marketing materials used in various industries. Students will plan and produce the content for media projects that integrate video, audio, still images, interactivity, two-dimensional animation and video. The course also explores the technology and production techniques involved in delivering digital content today. Additionally, the course will provide an introduction to basic instructional technology concepts that influence design, development and assessment decisions. The focus of classwork will be the production of media used in support of training and marketing activities commonly found in corporate, governmental, industrial, and scientific communities. (Prerequisites: FDTN-141 or equivalent course.) **Lab 3, Credits 3 (Spring)**

PHPS-217 **Media Production & Technology**
Media Technology explores the design, production and delivery of instructional media and marketing materials used in various industries. Students will plan and produce the content for media projects that integrate video, audio, still images, interactivity, two-dimensional animation and video. The course also explores the technology and production techniques involved in delivering digital content today. Additionally, the course will provide an introduction to basic instructional technology concepts that influence design, development and assessment decisions. The focus of classwork will be the production of media used in support of training and marketing activities commonly found in corporate, governmental, industrial, and scientific communities. (Prerequisites: FDTN-141 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

PHPS-261 **Intro to Special Effects Photography**
This course will explore various photographic techniques to create special or "trick" image effects, especially geared toward non-photo program students. The course will provide unique perspectives on using camera behaviors, optical principles or modified equipment as reality-altering tools. For example the role of a camera shutter for double exposures, long exposures, and light painting. Students will be given the opportunity to produce their own "trick" photographs, and will be introduced to the role of image manipulation programs and the use of software to create realistic yet unreal, ethereal image effects, such as floating people or objects. The course will also cover the history and practice of these techniques. The presentation and perception of images as reality on social media platforms will be an ongoing theme in the class. The use/application of AI, Sensi that is involved in manipulating photographic images will be analyzed and explored cell phone cameras will be used to execute the majority of class assignments. **Fee: A course fee is applied via student account.** (This course is available to RIT degree-seeking undergraduate students.) **Lecture 3, Credits 3 (Fall)**

PHPS-277 **Survey of Non-Conventional Imaging**
This course will provide an overview of imaging methods and imaging systems including principles of photographic surveying, mapping photogrammetry and aerial photography, photofinish photography, panoramic photography, peripheral photography, scanning imaging, infrared/ultraviolet photography, three-dimensional imaging including lenticular photography and alternative imaging such as schlieren, thermography, electrophotography and other specialized applications. Topics may vary from year to year allowing for the introduction of newly developing applications and systems. **Lecture 3, Credits 3 (Spring)**

PHPS-303 **Nature and Natural Sciences Photography**
This practical photography course will teach students how to apply scientific, technical and graphic imaging principles to optimize their natural science photography in the field, lab or studio. Students will produce publication-quality images using conventional and close-up lenses, scanners, artificial light sources (flash and flashlights), ambient light modifiers such as diffusers and tenting while documenting specimens in both the field and lab. Students will utilize post-production software and learn the constraints and ethics of image manipulation in natural science communication/publication. Students will photograph as their schedules permit and are encouraged to participate in volunteer field trips. (Prerequisites: PHPS-202 or PHAR-161 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

PHPS-307 **Surgical Photography**
This course, a collaboration between RIT & Rochester Regional Health, will introduce students to the issues and methods used in contemporary surgical photography. Students will be exposed to the fundamental photographic equipment and procedures used in operating rooms including proper file management in this era of HIPAA regulations. At the end of the course, students will have visited the surgery theater at least three times with the objective of making photographs. This course can be repeated. **Lecture 1, Credits 1 (Fall)**

PHPS-321 **Underwater Digital Photography**
This course is to prepare students for photographic assignments in an underwater environment. To accomplish this, students will complete basic scuba diving training and achieve a Professional Association of Dive Instructors (PADI) scuba diving certification. Through this course student will become familiar with basic shooting techniques, underwater photography camera housings, accessories, and equipment care and maintenance. There is an additional course fee that covers equipment, off campus facilities and insurance. (Prerequisites: PHPS-102 or PHAR-102 or PHAR-161 or equivalent course.) **Lab 3, Credits 3 (Fall, Summer)**

PHPS-321 **Underwater Digital Photography**
This course is to prepare students for photographic assignments in an underwater environment. To accomplish this, students will complete basic scuba diving training and achieve a Professional Association of Dive Instructors (PADI) scuba diving certification. Through this course student will become familiar with basic shooting techniques, underwater photography camera housings, accessories, and equipment care and maintenance. There is an additional course fee that covers equipment, off campus facilities and insurance. (Prerequisites: PHPS-102 or PHAR-102 or PHAR-161 or equivalent course.) **Lecture 2, Credits 3 (Fall, Summer)**

PHPS-322 **Advanced Diving and Underwater Imaging**
Students will develop underwater research skills, photo-documentation skills, underwater lighting techniques, camera positioning, working with a model, and working as a member of an interdisciplinary team. This course prepares students to complete a marine photographic project in an underwater environment. Students will as part of this course complete the PADI Advanced Diving Course and the Enriched Air Specialty Course. The project will take place in the Caribbean as part of a multidisciplinary experience. The final project will be a research paper and multimedia presentation. There is an additional cost for the study abroad class. (Prerequisites: PHPS-321 or equivalent course and minimum of 2nd year standing.) **Lab 3, Credits 3 (Fall, Spring)**

PHPS-322 **Advanced Diving and Underwater Imaging**
Students will develop underwater research skills, photo-documentation skills, underwater lighting techniques, camera positioning, working with a model, and working as a member of an interdisciplinary team. This course prepares students to complete a marine photographic project in an underwater environment. Students will as part of this course complete the PADI Advanced Diving Course and the Enriched Air Specialty Course. The project will take place in the Caribbean as part of a multidisciplinary experience. The final project will be a research paper and multimedia presentation. There is an additional cost for the study abroad class. (Prerequisites: PHPS-321 or equivalent course and minimum of 2nd year standing.) **Lecture 2, Credits 3 (Fall, Spring)**

PHPS-323**Advanced Diving and Underwater Imaging II**

Students who enroll will develop skills to have the knowledge needed to incorporate photography, videography or the ability to conduct research as well as develop problem-solving skills in underwater environments when working as a member of, or leading, an interdisciplinary team. The course will provide students repeating the experience with mentorship and dive lead opportunities as well as the opportunity to acquire additional advanced diving certifications. Students will be required to demonstrate advanced dive planning and management skills for a group of divers. Students will also complete an individual marine photographic project in an underwater environment. The project will take place in the Caribbean as part of a multidisciplinary experience. There is an additional cost for the study abroad class. This class is repeatable. (Prerequisites: PHPS-322 or equivalent course.) **Lab 3, Credits 3 (Fall, Spring)**

PHPS-323**Advanced Diving and Underwater Imaging II**

Students who enroll will develop skills to have the knowledge needed to incorporate photography, videography or the ability to conduct research as well as develop problem-solving skills in underwater environments when working as a member of, or leading, an interdisciplinary team. The course will provide students repeating the experience with mentorship and dive lead opportunities as well as the opportunity to acquire additional advanced diving certifications. Students will be required to demonstrate advanced dive planning and management skills for a group of divers. Students will also complete an individual marine photographic project in an underwater environment. The project will take place in the Caribbean as part of a multidisciplinary experience. There is an additional cost for the study abroad class. This class is repeatable. (Prerequisites: PHPS-322 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring)**

PHPS-326**Applied Color Theory**

This course investigates the principles of color science including theory and application. Topics include CIE colorimetry, color transformations, color order systems, metamerism, color inconsistency, color tolerance equations and spaces. (Prerequisite: PHPS-331 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

PHPS-328**Photographic Sciences Bulletin**

This course will introduce students to the production of an electronic magazine, containing content and activities relevant to the Photographic Sciences curriculum. The award-winning BPC Bulletin was first published in 1987. Each issue, one produced per semester, will require student editors to develop and create content - both written and photographic - and design an appropriate production schedule including electronic workflow and designation of group and individual responsibilities. Students will design and market the magazine using contemporary tools, working closely with internal and external resources to maximize the quality of the content and the dissemination of the electronic publication. (This class is restricted to students with PHIMTEC-BS or PHIMAG-BFA and at least 3rd year student standing.) **Lecture 3, Credits 3 (Fall, Spring)**

PHPS-331**Programming for Photographic Sciences**

This course will introduce students to programming as a data visualization tool and a programming language (Python). Students will learn the various capabilities of the language and how it can be used to rapidly prototype solutions to various imaging-related problems. As these solutions are developed, fundamental concepts of programming and data structures will be introduced. (Prerequisite: PHPS-211 or equivalent course.) **Lab 3, Credits 3 (Fall)**

PHPS-331**Programming for Photographic Sciences**

This course will introduce students to programming as a data visualization tool and a programming language (Python). Students will learn the various capabilities of the language and how it can be used to rapidly prototype solutions to various imaging-related problems. As these solutions are developed, fundamental concepts of programming and data structures will be introduced. (Prerequisite: PHPS-211 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

PHPS-332**Digital Image Processing**

This course covers the principles and fundamental techniques in writing digital image processing algorithms and computer programming techniques that are used in implementing said algorithms. Topics covered will include color space transformations, basic image manipulation, and spatial and frequency manipulations. (Prerequisite: PHPS-331 or equivalent course.) **Lab 3, Credits 3 (Fall, Spring)**

PHPS-332**Digital Image Processing**

This course covers the principles and fundamental techniques in writing digital image processing algorithms and computer programming techniques that are used in implementing said algorithms. Topics covered will include color space transformations, basic image manipulation, and spatial and frequency manipulations. (Prerequisite: PHPS-331 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring)**

PHPS-336**e-Sensitometry**

This course provides students with immersive experiences investigating the design of imaging systems and related technology with an emphasis on device characterization and image quality metrics and standards. Input and output standards including photographic and video systems will be covered in detail. Additionally, the course will explore measurable and subjective evaluations required for image quality. (Prerequisite: PHPS-106 or equivalent course.) **Lab 3, Credits 3 (Fall)**

PHPS-336**e-Sensitometry**

This course provides students with immersive experiences investigating the design of imaging systems and related technology with an emphasis on device characterization and image quality metrics and standards. Input and output standards including photographic and video systems will be covered in detail. Additionally, the course will explore measurable and subjective evaluations required for image quality. (Prerequisite: PHPS-106 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

PHPS-337**Color Measurement**

This is the second in a two-course required imaging core sequence, the first being Applied Color Theory. Students develop the background and skills required for successful laboratory practice in color measurement as used in scientific research. This includes data management, data analysis, and technical writing. Topics include the optical and electronic design of spectroradiometric and spectrophotometric instrumentation, the use of standard reference materials for calibration, data analysis techniques, properties of objects and radiation, evaluation of instrumentation and psychophysical experimentation. (Prerequisite: PHPS-211 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

PHPS-350**Topics in Photographic Sciences**

The photographic sciences and its educational offerings are in a constant state of growth due to rapid changes in technological applications and capabilities. Topics in Photography will provide students with the opportunity to explore this shifting terrain of photographic imaging. The content taught in this course will change frequently and the course may be repeated for credit, however each particular topic may have limits on repeatability. (Prerequisites: PHPS-202 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

PHPS-351**Studio Topics in Photographic Sciences**

The photographic sciences and its educational offerings are in a constant state of growth due to rapid changes in technological applications and capabilities. Studio Topics in Photographic Sciences will provide students with the opportunity to explore laboratory applications in this shifting terrain of photographic imaging. The content taught in this course will change frequently and the course may be repeated for credit, however each particular topic may have limits on repeatability. (Prerequisites: PHPS-202 or equivalent course.) **Lab 3, Credits 3 (Fall, Spring)**

PHPS-351**Studio Topics in Photographic Sciences**

The photographic sciences and its educational offerings are in a constant state of growth due to rapid changes in technological applications and capabilities. Studio Topics in Photographic Sciences will provide students with the opportunity to explore laboratory applications in this shifting terrain of photographic imaging. The content taught in this course will change frequently and the course may be repeated for credit, however each particular topic may have limits on repeatability. (Prerequisites: PHPS-202 or equivalent course.) **Lecture 2, Credits 3 (Fall, Spring)**

PHPS-401**Photographic Sciences Capstone I**

This course is the first of a two-term sequence designed to begin work on a major student project. The topic will relate to an aspect of the photographic sciences, including but not limited to photomicrography, image testing and quality, ophthalmic imaging, color, or other relevant topics. In this course, students will conceive and design a long-term project or experiment, including a proposal, description, goals, timeline, resources, and funding (if necessary). The student will work to construct and refine the proposal, and will identify a faculty advisor if needed for the execution of the project in PS Capstone II. The class sessions will focus on project planning and provide in-progress discussion of proposals. The project will be completed during the second semester (PHPS 402 – Photographic Sciences Capstone II). Projects will be student initiated within an individual's area of expertise. Completed projects will constitute a substantial portfolio/professional project. (Prerequisites: PHPS-202 or equivalent course and completion of First Year Writing (FYW) requirement.) **Lecture 3, Credits 3 (Fall)**

PHPS-403**Photographic Sciences Capstone II**

Students will execute a major project proposed in the first course of the sequence: PS Capstone I. Projects may address subjects related to the photographic sciences or other relevant topics. Students will provide a progress report to the course coordinator at set intervals. Class will meet weekly to provide discussion and feedback on individual projects. (Prerequisite: PHPS-401 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

PHPS-498 **Photography Internship**
The photography internship will provide students with the option to work in the photographic or visual communications field. Students may apply for internships to businesses based on the availability of positions and business job needs. Students must obtain permission of an instructor and complete the Internship Permission Form to enroll. **Note: No more than 6 credits of internships can be applied towards their degree** (This course is restricted to students in PHIMTEC-BS.) **Internship, Credits 1 - 3 (Fall, Spring, Summer)**

PHPS-499 **Photographic Sciences Co-op**
Cooperative Education will provide photographic and imaging technologies students with hands-on experience in their field, directly related to a student's major with an established studio or related business. Students will need to apply for co-ops, and interview as part of the selection process, based on available positions posted by the Co-op and Career Services Office, or found through the students' own research. In programs where co-op is a degree requirement, students must obtain permission of their program or graduate director prior to enrollment. Co-ops are typically paid work experience, and can be part-time (150-479 total hours within the term), or full-time (480+ hours within the term). Co-ops may be one or two consecutive terms - fall, spring, or summer - with department permission. (This course is restricted to students in PHIMTEC-BS.) **CO OP, Credits 0 (Fall, Spring, Summer)**

PHPS-516 **Scanning Electron Microscopy**
This course is designed to teach students how to operate and create images with a scanning electron microscope. Emphasis is on the understanding and optimization of the instrumental and photographic parameters associated with the SEM. A final poster is produced that examines and documents a single sample. (Prerequisites: PHPS-202 or equivalent course.) **Lab 4, Credits 3 (Spring)**

PHPS-516 **Scanning Electron Microscopy**
This course is designed to teach students how to operate and create images with a scanning electron microscope. Emphasis is on the understanding and optimization of the instrumental and photographic parameters associated with the SEM. A final poster is produced that examines and documents a single sample. (Prerequisites: PHPS-202 or equivalent course.) **Lecture 1, Credits 3 (Spring)**

PHPS-529 **High Speed Photography**
This course will investigate the theory and applications of photographic systems designed to record events of very short duration. Images will be analyzed to gain a more complete understanding of short duration events, including deriving data. The course will include the comparisons of the characteristics of digital video cameras, sequencing and timing control devices, as well as time magnification relationships. Synchronization systems, timing controls and high-speed flash and stroboscopic systems will also be covered. Introduction to high-speed video recording, the introduction to shadowgraph and Schlieren imaging systems will be included. Students will be introduced to programmable microprocessors for control of high-speed photographic equipment, and will gain experiences in the operation of equipment as well as proper planning, setup and basic data reduction techniques. **Fee: This course has a facilities fee for Non-SPAS students** (Prerequisites: PHPS-102 or PHAR-102 or PHAR-161 or equivalent course.) **Lab 3, Credits 3 (Fall)**

PHPS-529 **High Speed Photography**
This course will investigate the theory and applications of photographic systems designed to record events of very short duration. Images will be analyzed to gain a more complete understanding of short duration events, including deriving data. The course will include the comparisons of the characteristics of digital video cameras, sequencing and timing control devices, as well as time magnification relationships. Synchronization systems, timing controls and high-speed flash and stroboscopic systems will also be covered. Introduction to high-speed video recording, the introduction to shadowgraph and Schlieren imaging systems will be included. Students will be introduced to programmable microprocessors for control of high-speed photographic equipment, and will gain experiences in the operation of equipment as well as proper planning, setup and basic data reduction techniques. **Fee: This course has a facilities fee for Non-SPAS students** (Prerequisites: PHPS-102 or PHAR-102 or PHAR-161 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

PHPS-539 **Photographic Instrumentation**
The potential to create or modify photographic instrumentation for specific purposes has never been greater, due to the advancement of photographic technologies coinciding with an increased maker movement. This course will provide students with experience in designing, testing, and building devices for use in technical photographic applications. Students will gain experience extracting data from images and/or using images as a source of measurement. Projects will change each semester based on evolving technologies. Examples might include using microprocessors to control cameras, the creation of high-speed infrared triggering systems, or building of dedicated specialized LED illumination systems for use in the infrared or ultraviolet imaging. (Prerequisites: PHPS-102 or PHAR-102 or PHAR-161 or equivalent course.) **Lab 3, Credits 3 (Spring)**

PHPS-539 **Photographic Instrumentation**
The potential to create or modify photographic instrumentation for specific purposes has never been greater, due to the advancement of photographic technologies coinciding with an increased maker movement. This course will provide students with experience in designing, testing, and building devices for use in technical photographic applications. Students will gain experience extracting data from images and/or using images as a source of measurement. Projects will change each semester based on evolving technologies. Examples might include using microprocessors to control cameras, the creation of high-speed infrared triggering systems, or building of dedicated specialized LED illumination systems for use in the infrared or ultraviolet imaging. (Prerequisites: PHPS-102 or PHAR-102 or PHAR-161 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

PHPS-541 **Photomacrography: the Magnified image from 1x to 20x**
This course will include specialized camera and illumination techniques required to produce photographs of the unseen world utilizing high magnification. Images will be made in the magnification range of 1:1 - 20:1 (at capture) using various types of camera systems. Lighting, applied optics, subject management techniques as well as extended depth of field methods will be evaluated in theory and practice. Hardware and software solutions, such as focus stacking, will be explored and applied to contend with the unique challenges of photographing under high magnification. **Fee: A facilities fee for non- SPAS and non-SOFA students is required for this course, in addition to materials fees.** (Prerequisites: PHPS-102 or PHAR-102 or PHAR-161 or equivalent course.) **Lab 3, Credits 3 (Fall)**

PHPS-541 **Photomacrography: the Magnified image from 1x to 20x**
This course will include specialized camera and illumination techniques required to produce photographs of the unseen world utilizing high magnification. Images will be made in the magnification range of 1:1 - 20:1 (at capture) using various types of camera systems. Lighting, applied optics, subject management techniques as well as extended depth of field methods will be evaluated in theory and practice. Hardware and software solutions, such as focus stacking, will be explored and applied to contend with the unique challenges of photographing under high magnification. **Fee: A facilities fee for non- SPAS and non-SOFA students is required for this course, in addition to materials fees.** (Prerequisites: PHPS-102 or PHAR-102 or PHAR-161 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

PHPS-542 **Photomicrography**
The microscope has proven itself to be an important tool for investigation since its invention in 1595. This course is designed to explore how to create magnified images of objects too small to be seen with the naked eye. Students will use a variety of microscopy techniques including differential interference contrast, fluorescence, phase contrast, reflected light, industrial, and polarized light. The course will investigate the applications of optical and digital enhancement techniques. Specimen preparation as well as electronic flash will be used to create stop-motion video. Assignments will allow students to devise appropriate photomicrographic approaches based on the data and intended use of the images. (Prerequisites: PHPS-102 or PHAR-102 or PHAR-161 or equivalent course.) **Lab 3, Credits 3 (Spring)**

PHPS-542 **Photomicrography**
The microscope has proven itself to be an important tool for investigation since its invention in 1595. This course is designed to explore how to create magnified images of objects too small to be seen with the naked eye. Students will use a variety of microscopy techniques including differential interference contrast, fluorescence, phase contrast, reflected light, industrial, and polarized light. The course will investigate the applications of optical and digital enhancement techniques. Specimen preparation as well as electronic flash will be used to create stop-motion video. Assignments will allow students to devise appropriate photomicrographic approaches based on the data and intended use of the images. (Prerequisites: PHPS-102 or PHAR-102 or PHAR-161 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

PHPS-546 **Ophthalmic Imaging I**
This is the first of a two-course series designed to investigate proper patient management and camera/photographic techniques required in contemporary ophthalmic photography and imaging. Diagnostic evaluation of ocular anatomy and physiology utilizing special cameras/equipment is examined and practiced. In addition to retinal fundus photography, students will demonstrate diagnostic medical imaging techniques such as fluorescein angiography, fundus autofluorescence, optical coherence tomography and scanning laser ophthalmoscopy. Retinal disease processes and recognition will also be combined with a working knowledge of ocular anatomy and physiology. The completion of this course and Ophthalmic Imaging II provide one year of residency credit toward the Ophthalmic Photographer's Society's professional certifications (Certified Retinal Angiographer and Optical Coherence Tomographer). ** Fee: A fee for an ocular exam is required**. (Prerequisites: PHPS-102 or PHAR-102 or PHAR-161 or equivalent course.) **Lab 3, Credits 3 (Fall)**

PHPS-546**Ophthalmic Imaging I**

This is the first of a two-course series designed to investigate proper patient management and camera/photographic techniques required in contemporary ophthalmic photography and imaging. Diagnostic evaluation of ocular anatomy and physiology utilizing special cameras/equipment is examined and practiced. In addition to retinal fundus photography, students will demonstrate diagnostic medical imaging techniques such as fluorescein angiography, fundus autofluorescence, optical coherence tomography and scanning laser ophthalmoscopy. Retinal disease processes and recognition will also be combined with a working knowledge of ocular anatomy and physiology. The completion of this course and Ophthalmic Imaging II provide one year of residency credit toward the Ophthalmic Photographer's Society's professional certifications (Certified Retinal Angiographer and Optical Coherence Tomographer). ** Fee: A fee for an ocular exam is required**. (Prerequisites: PHPS-102 or PHAR-102 or PHAR-161 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

PHPS-547**Ophthalmic Imaging II**

This course will integrate advanced ophthalmic imaging techniques with disease identification and proper patient management required in contemporary ophthalmic clinical environments. Diagnostic evaluation of ocular anatomy and physiology utilizing special cameras/equipment is presented. Ophthalmological disease processes and recognition will also be emphasized. Advanced ophthalmological imaging modalities will be explored, including OCT-A, slit lamp biomicrography and fundus autofluorescence. **Note: A clinical component is required of students enrolled in this course** (Prerequisite: PHPS-546 or equivalent course.) **Lab 3, Credits 3 (Spring)**

PHPS-547**Ophthalmic Imaging II**

This course will integrate advanced ophthalmic imaging techniques with disease identification and proper patient management required in contemporary ophthalmic clinical environments. Diagnostic evaluation of ocular anatomy and physiology utilizing special cameras/equipment is presented. Ophthalmological disease processes and recognition will also be emphasized. Advanced ophthalmological imaging modalities will be explored, including OCT-A, slit lamp biomicrography and fundus autofluorescence. **Note: A clinical component is required of students enrolled in this course** (Prerequisite: PHPS-546 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

PHPS-563**Forensic Photography**

Proper documentation of crime scenes and evidence is extremely important in the investigation of crimes by police agencies and forensic labs. This course will provide hands-on experience documenting crime scenes and related evidence. Students will learn how to prepare images for presentation in court. Topics covered will include crime scene management, evidence handling, crime scene documentation, general evidence documentation, photographic techniques for the enhancement of evidence, and court display preparation. This is a blended course, with lectures delivered online and two in-person Saturday lab sessions. (Prerequisites: PHPS-102 or PHAR-102 or PHAR-161 or equivalent course.) **Lab 1, Credits 3 (Spring)**

PHPS-563**Forensic Photography**

Proper documentation of crime scenes and evidence is extremely important in the investigation of crimes by police agencies and forensic labs. This course will provide hands-on experience documenting crime scenes and related evidence. Students will learn how to prepare images for presentation in court. Topics covered will include crime scene management, evidence handling, crime scene documentation, general evidence documentation, photographic techniques for the enhancement of evidence, and court display preparation. This is a blended course, with lectures delivered online and two in-person Saturday lab sessions. (Prerequisites: PHPS-102 or PHAR-102 or PHAR-161 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

PHPS-599**Photography Independent Study**

Photography independent study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser will propose a course of study. Photography Independent Study students must obtain permission of an instructor and complete the Independent Study Permission Form to enroll. **Note: Students can only earn up to 6 credits of independent study towards completion of their degree** (This course is restricted to students in PHIMTEC-BS.) **Ind Study, Credits 1 - 3 (Fall, Spring, Summer)**

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Course numbering: RIT courses are generally referred to by their alphanumeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100-299), upper division (300-599), or graduate level (600 and above).

Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.

Accounting

ACCT-110 **Financial Accounting**
 An introduction to the way in which corporations report their financial performance to interested stakeholders such as investors and creditors. Coverage of the accounting cycle, generally accepted accounting principles, and analytical tools help students become informed users of financial statements. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

ACCT-120 **Management Accounting**
 Introduction to the use of accounting information by managers within a business. Explores the value of accounting information for the planning and controlling of operations, assessing the cost of a product/service, evaluating the performance of managers, and strategic decision making. (Prerequisites: ACCT-110 or NACC-205 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

ACCT-305 **Accounting Profession**
 This course consists of a series of workshops designed to introduce accounting students to the skills needed to be successful in job and co-op searches and the transition into professional life and careers. Students will establish their career goals, create relevant documents such as resumes and cover letters, and develop skills needed to succeed in pursuing accounting positions or graduate school. Students will be expected to interact with business professionals, study materials related to current and emerging trends in accounting and business, and develop professional deportment. Active class participation is required. Note: Matriculated in Saunders undergraduate accounting program. (Prerequisites: This class is restricted to students with at least 2nd year standing in ACCT-BS program.Co-requisite: ACCT-360 or equivalent course.) **Lecture 1, Credits 1 (Fall)**

ACCT-360 **Intermediate Financial Accounting I**
 Extensive exposure to the accounting cycle with full integration of the data flow in an accounting information system. Accounting theory developed by accounting standard-setting bodies is covered in-depth. Generally accepted accounting principles are discussed as they apply to the preparation of financial statements and the recognition and measurement of financial statement elements, primarily assets. International Financial Reporting Standards are introduced as they relate to course subject matter. (Prerequisites: ACCT-210 or NACC-206 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

ACCT-365 **Intermediate Financial Accounting II**
 In-depth consideration of generally accepted accounting principles and theory as they apply to the recognition and measurement of common liabilities and stockholders' equity, as well as income taxes, pensions and leases. Issues related to dilutive securities, earnings per share, accounting changes, revenue recognition, and the statement of cash flows are also addressed. International Financial Reporting Standards are introduced as they relate to course subject matter. (Prerequisites: ACCT-360 or 0101-408 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

ACCT-399 **Accounting PT Co-op**
 Half semester of paid work experience in accounting. (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Fall, Spring, Summer)**

ACCT-420 **Personal and Small Business Taxation**
 A basic introductory course in federal income taxation. Emphasis is on taxation of individuals and sole proprietorships. Topics include income measurement and deductibility of personal and business expenses. **Lecture 3, Credits 3 (Fall, Spring)**

ACCT-430 **Cost Accounting**
 Intermediate-level coverage of operational budgeting and performance evaluation. Development and use of cost data for external reporting and internal planning and control. Topics include operational budgeting, performance evaluation, job costing, process costing, joint product, and by-product costing, service department cost allocation, standard costing, activity-based costing, back-flush costing, and transfer pricing. Development of relevant cost information for special purposes is also considered. (Prerequisites: ACCT-210 or NACC-206 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

ACCT-440 **Advanced Taxation**
 Emphasis is on tax treatment of property transactions and taxation of business entities. Also covers the use of technology to prepare complex returns and to research tax issues. **Lecture 3, Credits 3 (Fall, Spring)**

ACCT-445 **Accounting Information Systems**
 This course combines information systems concepts and accounting issues. In this course, we discuss the conceptual foundations of information systems, their applications, the control and auditing of accounting information systems, and the system development process. Topics include the business process, e-business, relational database, database design, computer fraud and security, accounting cycle, system analysis and AIS development strategies. Students analyze accounting information systems topics through problem solving, group project, presentations, exams, and case studies. (Prerequisites: ACCT-110 or NACC-205 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

ACCT-488 **Accounting Co-op Summer**
 One summer semester of paid work experience in accounting. (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Summer)**

ACCT-489 **Seminar in Accounting**
 Study of accounting topics reflecting contemporary issues and/or current technological advancements impacting the development, implementation and management of accounting, taxation, and auditing systems in organizations. Seminar topics have ranged from ethics to computerized accounting systems. Topics for a specific semester will be agreed to prior to the course offering. (Prerequisites: ACCT-210 or NACC-206 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

ACCT-490 **Auditing**
 A study of the legal, ethical, and technical environment in which the auditor works. Current auditing theory, standards, procedures, and techniques are studied. The audit process is studied to ascertain how it leads to the development of an audit opinion. The Sarbanes-Oxley Act and internal control issues are examined. Students are also introduced to accountants' professional responsibility. (Prerequisites: ACCT-365 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

ACCT-499 **Accounting Co-op**
 One semester of paid work experience in accounting. (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Fall, Spring, Summer)**

ACCT-500 **Cost Management in Technical Organizations**
 A first course in accounting for students in technical disciplines. Topics include the distinction between external and internal accounting, cost behavior, product costing, profitability analysis, performance evaluation, capital budgeting, and transfer pricing. Emphasis is on issues encountered in technology-intensive manufacturing organizations. This course is not available for Saunders College of Business students. (This class is restricted to undergraduate students with at least 3rd year standing.) **Lecture 3, Credits 3 (Spring)**

ACCT-510 **Internal Auditing**
 Course explores the role of the internal audit function in the management of companies. Topics include internal vs. external auditing, internal control issues, reliability and integrity of information; compliance with policies, procedures, laws and regulations; efficiency of operations. Ethical considerations affecting the internal audit function are introduced. (Prerequisites: ACCT-210 or NACC-206 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

ACCT-550 Accounting for Government and Not-for-profit Organizations

This course provides a detailed examination and discussion of the accounting principles used by governmental and not-for-profit entities. The course focuses on the use of special funds for such entities as state and local governments, colleges and universities, hospitals and other health care entities, voluntary health and welfare organization, and other organizations. Students will learn what characterizes an entity as one for which the GASB is the authoritative standard-setting body versus one for which the FASB is the authoritative standard-setting body and develop an understanding of why two unique sets of accounting principles were developed to serve these entities. (Prerequisites: ACCT-365 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

ACCT-560 Forensic Accounting and Fraud Examination

This course provides an introduction to the principles and methodologies of fraud detection and prevention. Topics may include the nature and types of fraud, fraud investigation and detection, financial statement fraud, consumer fraud, asset misappropriation, corruption, and tax evasion. (Prerequisites: ACCT-210 or NACC-206 or equivalent course and 3rd year standing.) **Lecture 3, Credits 3 (Fall)**

ACCT-599 Independent Study Accounting

The student will work independently under the supervision of a faculty advisor. **Ind Study 3, Credits 3 (Fall, Spring, Summer)**

Business Analytics
BANA-255 Data Literacy, Analytics, and Decision Making

This course serves as an introduction to the uses (and potential misuses) of data in a wide variety of social settings, including the exploration of contemporary techniques to analyze such data. Data acquisition, cleansing, management, analysis, and visualization will be addressed through hands-on projects. Project work will include contemporary social problems addressed using a dynamic set of resources and technologies. An emphasis will be placed on how insights gleaned from data analysis can be used to guide individual and group decision-making scenarios. **Lecture 3, Credits 3 (Fall, Spring)**

BANA-489 Seminar in Business Analytics

Special topics seminars offer an in-depth examination of current events, issues and problems unique to business analytics. Specific topics will vary depending upon student and faculty interests and on recent events in the business world. Seminar topics for a specific semester will be announced prior to the course offering. These seminars may be repeated for credit since topics will normally vary from semester to semester. (instructor-determined) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

Business Legal Studies
BLEG-200 Business Law I

An introduction to legal principles and their relationship to business organizations. Explores the U.S. legal system, the U.S. court system, civil and criminal procedure, the role of government agencies, legal research, and the substantive areas of law most relevant to business, including constitutional law, tort law, criminal law, contract law, intellectual property, debtor-creditor relations, bankruptcy, business entities, securities regulation, and antitrust law. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

BLEG-250 Law, Business, and Society

This course provides an introductory survey of significant aspects of how select laws in the U.S. affect and are affected by society and commercial enterprises. The focus is on legal principles and societal considerations. Ethical issues in certain contexts will be discussed as well. Students will be introduced to basic legal research. **Lecture 3, Credits 3 (Fall, Spring)**

BLEG-300 Business Law II

Explores the impact of the Uniform Commercial Code and other substantive areas of law on business operations. Emphasis is on topics included on the certified public accounting exam, including provisions of the Uniform Commercial Code dealing with the sale and lease of goods, product warranties, commercial paper, negotiable instruments and secured transactions. Other topics include business entities, creditors' rights, bankruptcy, environmental law, and insurance law. (Prerequisite: BLEG-200 or BLEG-250 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

BLEG-489 Seminar in Business Law

Advanced study of business and legal topics reflecting contemporary issues and/or current technological advancements impacting the understanding of taxation, business, and legal issues in organizations. Seminar topics may range from international intellectual property rights to interactivity between taxation, law, and ethics. Topical coverage for a particular semester will be announced prior to the course offering. (This course requires permission of the Instructor to enroll.) **Lecture 3, Credits 3 (Fall, Spring)**

Decision Sciences
DECS-225 Management Science

A survey of quantitative approaches to decision making. Topics include formulation and solution of linear programming models, decision analysis and simulation. Involves use of computer software. (Prerequisites: STAT-145 or equivalent course.) **Lecture 3, Credits 3**

DECS-310 Operations Management

A survey of operations and supply chain management that relates to both service- and goods-producing organizations. Topics include operations and supply chain strategies; ethical behavior; forecasting; product and service design, including innovation and sustainability; capacity and inventory management; lean operations; managing projects; quality assurance; global supply chains; and the impacts of technology. (Prerequisites: STAT-145 or MATH-251 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

DECS-350 Project Management

A study of the concepts and applications of project management. This course covers the organization and management of projects, including the role and responsibilities of the project manager, team responsibilities, tools and techniques for project planning, budgeting, and control, work breakdown, risk assessment, and project termination. The learning environment will include lectures and discussion, group exercises, case studies, and examinations. (This class is restricted to undergraduate students with at least 3rd year standing.) **Lecture 3, Credits 3**

DECS-399 Decision Sciences PT Co-op

Half semester of paid work experience in accounting. (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Fall, Spring, Summer)**

DECS-435 Supply Chain Management Fundamentals

This course introduces the basic concepts in supply chain management fundamentals as well as strategies and practice, and examines important managerial issues. Topics covered include forecasting, inventory management, third-party logistics, partnering, contracts, event management and conflict resolution, e-business, and strategy. (Prerequisites: DECS-310 or equivalent course.) **Lecture 3, Credits 3**

DECS-445 Managing Supplier Relations

This course introduces students to the subject of managing supplier relations and purchasing activities. Topics covered include supplier selection, vendor pricing, materials quality control, value analysis, make-or-buy, speculation and hedging, and international sourcing as well as the legal and ethical constraints faced by purchasing practitioners. (This class is restricted to undergraduate students with at least 3rd year standing.) **Lecture 3, Credits 3**

DECS-489 Seminar in Decision Science

Special topics seminars offer an in-depth examination of current events, issues and problems unique to decision science. Specific topics will vary depending upon student and faculty interests and on recent events in the business world. Seminar topics for a specific semester will be announced prior to the course offering. These seminars may be repeated for credit since topics will normally vary from semester to semester. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 3, Credits 3**

DECS-499 Decision Science Co-op

One semester of paid work experience in decision science (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Fall, Spring, Summer)**

DECS-550 Supply Chain Management Capstone

In this course, students integrate the theoretical and practical skills they have acquired throughout the curriculum to design and manage the source, make, plan, and deliver functions of a global supply chain using several SCM simulation packages. In addition, cases would be assigned for the students to analyze and write comprehensive reports. (Prerequisites: DECS-435 and DECS-445 and INTB-315 or equivalent courses. This course is restricted to Undergraduate Saunders College of Business students.) **Lecture 3, Credits 3 (Spring)**

DECS-599 Independent Study Decision Sciences

The student will work independently under the supervision of a faculty adviser. (Instructor approval) (Enrollment in this course requires permission from the department offering the course.) **Ind Study 3, Credits 3 (Fall, Spring, Summer)**

Finance

FINC-120 **Personal Financial Management**

Examines financial decisions people must make in their personal lives. Covers personal taxation, housing and mortgages, consumer credit, insurance (including life, health, property and casualty), and retirement and estate planning. Also reviews the common financial investments made by individuals, including stocks, bonds, money market instruments and mutual funds. This class involves extensive use of the internet for access to information. (Students in the Finance Program may use this course only as a free elective, not as a course creditable towards the Finance Program.) (This course is available to RIT degree-seeking undergraduate students.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

FINC-220 **Financial Management**

Basic course in financial management. Covers business organization, time value of money, valuation of securities, capital budgeting decision rules, risk-return relation, Capital Asset Pricing Model, financial ratios, global finance, and working capital management. (Prerequisites: (ECON-101 or ECON-201) and ACCT-110 and (STAT-145 or STAT-251 or CQAS-251 or MATH-251 or MATH-252 or STAT-205) or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

FINC-320 **Professional Financial Planning and Management**

Project-based course in which accounting and finance students develop an integrated understanding of personal financial planning and management. Topics include budgeting and cash flow, personal taxation (including basics of flow-through entities), mortgage financing and real estate, consumer credit, insurance (including life, health, property and casualty) and retirement and estate planning. Also addresses financial investments made by individuals, including stocks, bonds, money market instruments and mutual funds. Emphasis is on understanding these topics as a financial professional, commensurate with undergraduate study in finance or accounting. (Prerequisites: ACCT-210 and FINC-220 or equivalent courses.) **Lecture 3, Credits 3 (Summer)**

FINC-352 **Financial Management II**

Advanced course in financial management. Covers project cash-flow analysis, issuance of securities, cost of capital, debt policy, dividend policy, and market efficiency. (Prerequisites: FINC-220 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

FINC-361 **Financial Institutions and Markets**

This course provides a comprehensive survey of the major financial markets and institutions in the U.S. and abroad. This course analyzes the important structural features of the major markets and notes the interaction of the financial markets with the decisions of financial institutions, corporations, and the government. (Prerequisites: FINC-220 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

FINC-362 **Intermediate Investments**

Focuses on the financial investment problems faced by individuals and institutions. Theoretical topics include asset pricing, hedging and arbitrage. Application topics include risk management in bond-and-stock portfolio context. A discussion of options, futures and swaps also is included. (Prerequisites: FINC-220 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

FINC-399 **Finance PT Co-op**

Half semester of paid work experience in finance (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Fall, Spring, Summer)**

FINC-420 **International Finance**

Discusses the problems posed by the international financial environment in which corporations operate. In particular, students learn to quantify and manage risks arising from shifting exchange rates. Other topics include exchange rate systems, international trade finance, international capital budgeting, country risk analysis, and long-term international financing. (Prerequisites: FINC-220 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

FINC-425 **Stock Market Algorithmic Trading**

The course is a "hands-on" lab-based class designed to help students develop algorithmic trading strategies to invest in the stock market that can be implemented by retail and professional traders. The course has a strong emphasis on practical application with the purpose of building marketable skills for careers in finance. Students learn how to design algorithmic trading models through the use of a computerized trading platform that allows back-testing of data on thousands of different stocks. The software platform includes an automated wizard for building advanced technical trading models without programming knowledge; but also has an embedded programming language, similar to C-sharp, for those students that have those skills and elect to use them. (Knowledge of programming is not required; and there are no pre or co-requisites; but a laptop is strongly recommended.) **Lecture 3, Credits 3 (Spring)**

FINC-430 **Advanced Corporate Financial Planning**

This course focuses on strategic financial management of the corporation. It employs pedagogies that emphasize analysis and evaluation of applied financial problems. Topics include working capital management, financial statement analysis, valuation, capital budgeting decisions, and risk management. (Prerequisites: FINC-352 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

FINC-460 **Financial Analysis and Modeling**

In this course, students learn to obtain and organize financial data and conduct financial analysis such as discounted cash flow analysis, risk analysis and financial forecasting. Sources of data include web-based sources and proprietary databases. Excel will be the main software tool. (Prerequisites: FINC-352 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

FINC-470 **Introduction to Options and Futures**

This course explores risk management from the viewpoint of a finance professional. The primary tools used are derivative instruments such as options, futures and swaps. Students learn about the basic features of derivative instruments: how to value them, how they are traded, and how to use them to mitigate various types of financial risk. (Prerequisites: FINC-220 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

FINC-488 **Finance Co-op Summer**

One summer semester of paid work experience in finance. (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Summer)**

FINC-489 **Seminar in Finance**

Special topics seminars offer an in-depth examination of current events, issues and problems unique to finance. Specific topics will vary depending upon student and faculty interests and on recent events in the business world. Seminar topics for a specific semester will be announced prior to the course offering. These seminars may be repeated for credit since topics will normally vary from semester to semester. (Instructor determined) (This course is available to RIT degree-seeking undergraduate students.) **Lecture 3, Credits 3**

FINC-499 **Finance Co-op**

One semester of paid work experience in finance (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Fall, Spring, Summer)**

FINC-559 **Financing New Ventures**

The course focuses on financial issues affecting an entrepreneur. The course emphasizes, identifies and follows the wealth creation cycle. The wealth creation cycle begins with an idea for a good, product or service, progresses to an initial company startup, passes through successive stages of growth, considers alternative approaches to resource financing, and ends with harvesting the wealth created through an initial public offering, merger or sale. Identification and valuation of business opportunities, how and from whom entrepreneurs raise funds, how financial contracts are structured to both manage risk and align incentives, and alternative approaches by which entrepreneurs identify exit strategies are reviewed. (This class is restricted to undergraduate students with at least 3rd year standing.) **Lecture 3, Credits 3 (Fall, Spring)**

FINC-580 **Financial Analytics**

Financial analytics is the use of business analytics methods and tools on financial data to solve problems such as investment and risk analysis, portfolio optimization, valuation, default modeling, and so on. This course introduces a contemporary tool (R or Python) and its use in solving these problems. In this hands-on course, students also learn about the field of fintech. (Prerequisites: FINC-220 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

FINC-599 **Independent Study Finance**

The student will work independently under the supervision of a faculty adviser. (Instructor approval) (This course requires permission of the Instructor to enroll.) **Ind Study 3, Credits 3 (Fall, Spring, Summer)**

Hospitality and Tourism Management

HSPT-121 **Principles of Food Production**

Principles of Food Production is the basic course covering food preparation methods, food standards of quality, product identity, food presentation, professional behavior in food service, food sanitation in practice, and techniques for adding value to basic food products. Students who have completed Principles of Food Production should be able to function effectively as a food professional in a kitchen environment including demonstrating professional appearance, professional behaviors, and knowledge of the many different food preparation techniques appropriate for the various categories of foods, quality standards of the categories of food products, effective food presentation, food safety and sanitation practices, teamwork, and clean-up practices. Students are required to achieve their co-curricular requirement - the ServSafe Certification - by the end of this course. This course is not available for audit. **Fee: Lab fee associated with this course** (This course is restricted to students in the HSPS-BS, HSPS-AAS or NUTR-BS program.) **Lec/Lab 6, Credits 3 (Fall, Spring)**

HSPT-123**Sanitation and Safety**

A discussion of current problems confronting the industry as a result of the most recent legislative developments as they relate to food safety and health around the globe. Material will focus on current regulations as per the latest Food Codes. Topics include Hazard Analysis Critical Control Point (HACCP) procedures, kitchen safety, and facility sanitation. Students will take the National Restaurant Association ServSafe Examination upon completion of the course and receive a ServSafe certificate if they score 75 or better. **Lecture 1, Credits 1 (Spring)**

HSPT-125**Hospitality and Tourism Management Fundamentals**

This introductory course provides students with an overview of the hospitality industry and career opportunities within the industry. Students examine the growth and development of industry segments and their distinguishing characteristics, trends, and current issues. The concepts and practices of hospitality management are examined and discussed. **Lecture 3, Credits 3 (Fall)**

HSPT-131**Lodging Operations Management**

Lodging operations examines the vision and mission, organizational structures, and the structure and functions of different divisions within the hotel. The course emphasizes the rooms divisions, and its relationship with other departments such as food and beverage, sales and marketing, human resources, and security divisions. Current issues of lodging organizations, application of customer service, and managerial skills are discussed. (This course is restricted to HSPS-BS and HSPS-AAS Major students.) **Lecture 3, Credits 3 (Fall)**

HSPT-151**International Food Distribution**

The course will focus on the economic geography of food production and the associated economics of physical distribution and market structure. Special emphasis will be placed on examining the impact multinational food companies have on international distribution channels. The sourcing, purchasing, and synergy strategies of multinational companies will be considered in conjunction with the economic principles supporting strategy formulation. Special emphasis will be placed on the role of commodities, food processing, packaging, and retail operation in the value-added chain. **Lecture 3, Credits 3 (Fall)**

HSPT-153**Foods of the World**

This course is an introduction to the foods of many regions of the world. Indigenous ingredients and geographical influences on the development of each regional cuisine are included. Food customs and special food preparation techniques of the various cultures are addressed. This course is not available for audit. **Fee: Lab fee associated with this course** **Lec/Lab 2, Credits 2 (Fall, Spring)**

HSPT-155**Food and Travel**

This course introduces students to the concept of food in the hospitality and service industry as representative of a location's culture and values. The course analyzes the existing and emerging client base and delves deeply into the topic of trends and opportunities based on food and beverage. Students will examine the importance of service chains where understanding and knowledge of regional/international food plays a vital role in new product development. This course is an exploration of the combined food and travel experience, providing students with the knowledge sets required to meet today's international food travelers' desires and expectations. **Lecture 3, Credits 3 (Spring)**

HSPT-160**Beers of the World**

An introduction to Beers: history, the brewing process, distribution systems, production, flavor characteristics, partnering with foods, and handling and serving techniques. Beers produced from the major beer brewing centers of the world will be tasted and compared with similar brews from different countries. The way alcohol is processed in the human body is considered as well as the economic impact of brewing and distributing beer will be explored. This course is not available for audit. **Fee: Lab fee associated with this course** **Lec/Lab 2, Credits 2 (Fall, Spring)**

HSPT-161**Wines of the World I**

This course is an introduction to global wine history, vineyard methods, production techniques, grape characteristics, sensory evaluation, and marketing and distribution. This course is not available for audit. **Fee: Lab fee associated with this course** **Lec/Lab 2, Credits 2 (Fall, Spring)**

HSPT-162**Wines of the World II**

This course builds on what was learned in Wines of the World I. More in depth exploration of global wine history, vineyard methods, production techniques, grape characteristics, sensory evaluation, and marketing and distribution. Like its sister courses, Beers of the World, Foods of the World, and Wine and Food Pairing, there are weekly tastings and recommendations on pairings. This provides practical applications for daily use in personal and business situations. This course is not available for audit. **Fee: Lab fee associated with this course** (Prerequisites: HSPT-161 or equivalent course.) **Lec/Lab 2, Credits 2 (Fall, Spring)**

HSPT-163**Wine Connoisseur**

The majority of Wine Connoisseur classes will have guest speakers from the wine industry. Through class and lab work involving tastings, topics covered will include the technical aspects of viticulture and viniculture, the Three Tier System, health considerations, tourism, global regulations, wine competitions, cellaring and service, food pairing, public relations, marketing, social media, and trends. This provides practical applications for daily use in personal and business situations as well as co-op and job opportunities. This course is not available for audit. **Fee: Lab fee associated with this course** (Prerequisites: HSPT-161 or equivalent course.) **Lec/Lab 2, Credits 2 (Spring)**

HSPT-165**Wine and Food Pairing I**

This course is an introduction of pairing food with wine and other beverages. Students will experience "What grows together, goes together," and discover how regional wines and food pairings have a natural affinity for one another. Students will design their own menu and keep a tasting journal. This course experience includes sampling of food and wine, cooking demonstrations, and guest speakers. This course is not available for audit. **Fee: Lab fee associated with this course** **Lec/Lab 2, Credits 2 (Fall, Spring)**

HSPT-171**Introduction to Viticulture and Viniculture**

An in-depth, hands-on exploration of vineyard practices, grape growing, and winemaking techniques. This course focuses on the cool-climate, Finger Lakes wine region and includes several visits to local vineyards, wineries, and businesses for hands-on experiences. Possible participation in aspects of harvest, processing of fruit, and winemaking processes while learning from industry leaders. Speakers will illuminate how decisions are made involving start-up, finances, the science involved in production, marketing, and more in their various industries. There will be tastings of grapes, unfinished and finished wines. A group winemaking project allows further exploration. This course is not available for audit. **Fee: Lab fee associated with this course** (Prerequisites: HSPT-161 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall)**

HSPT-173**Beverage Fermentation and Distillation**

Exploration of traditional and emerging trends in fermentation and distillation of beverages. In addition to in-class lectures, group and individual presentations, this course will include visits to local businesses for hands-on experiences involving beer, wine, and spirits. Speakers will illuminate how decisions are made involving start-up, finances, the science involved in production, marketing, and more in their various industries. There will be tastings of wines, beers, and spirits. An individual innovative project allows in-depth exploration of wine, beers, and spirits in or outside their own field of interest. This provides practical applications for daily use in personal and business situations. This course is not available for audit. **Fee: Lab fee associated with this course** **Lecture 3, Credits 3 (Fall)**

HSPT-175**Marketing Wine, Beer and Spirits**

This course will focus on understanding how to develop a marketing strategy and plan to bring products to market. The specific focus will be on marketing wine, beer, and spirits. In addition to understanding how to build a marketing plan, this class will also analyze the trends within wine, beer, and spirits. There are field trips, guest speakers, and tastings of wine, beer, and spirits throughout the course. This provides practical applications for daily use in personal and business situations as well as co-op and job opportunities. This course is not available for audit. **Fee: Lab fee associated with this course** **Lec/Lab 3, Credits 3 (Spring)**

HSPT-181**Principles of Food, Hotel, and Tourism Operations**

This course introduces the student to the terms and concepts associated with the food, hotel, and tourism industries. The following distinctive operations will be explored: resorts, restaurants, catering, institutional food service, transportation, attractions, and events. The fundamental service philosophy behind the service sector will be introduced. **Lecture 3, Credits 3 (Fall)**

HSPT-191**Effective Communications in Hospitality Industry**

This course acts as an introduction to the world of public speaking, teaching hospitality students how to prepare and present individual as well as group presentations. Combining theoretic speech principles with experiential learning, students will learn how to structure and present informative and persuasive speeches that hospitality professionals have to develop. **Lecture 3, Credits 3 (Fall)**

HSPT-215**Principles of Food Production and Service**

Principles of Food Production and Service is a basic course covering food preparation methods, quality standards, food presentation, professionalism in food preparation and service, sanitation and safety processes in commercial kitchens, kitchen and restaurant organization and roles, and food service styles. Students completing this course should be able to function effectively in a kitchen or restaurant environment; including demonstrating professional appearance and behaviors; and knowledge of food preparation techniques, effective food presentation, food safety and sanitation practices, appropriate service styles, teamwork, and cleanup practices. Students are expected to achieve their required co-curricular requirement – the ServSafe Manager certification – by the end of this course. **Lec/Lab 6, Credits 3 (Fall)**

HSPT-223 Food and Beverage Management
This course will provide the student with the knowledge needed for effective management of food service operations. Students will identify trends in the food and beverage industry, gain knowledge of food and beverage management principles and understand how providing exceptional guest service can maximize profits in the hospitality industry. Topics will include food and beverage purchasing, inventory, costing, service styles, financial controls, menu design, sanitation, safety, ethics, food service automation, hardware and software, legal concerns, equipment selection, and service innovations in design and layout of food establishments. (This course is restricted to HSPS-BS, HSPS-AAS, NUTR-BS and NUTR-AAS Major students with at least 2nd year status.) **Lecture 3, Credits 3 (Spring)**

HSPT-224 Serving Alcohol Safely
Responsible alcohol service is an issue that touches businesses, guests, and their communities. It is a vital part of running a successful hospitality operation. Students can earn the National Restaurant Association's ServSafe Alcohol certificate. (This course is restricted to HSPS-BS and HSPS-AAS Major students.) **Lecture 1, Credits 1 (Spring)**

HSPT-225 Hospitality and Tourism Management Fundamentals
Hospitality and tourism industry is one of the largest industries in the world. This introductory course provides students with an overview of hospitality industry and segments of travel and tourism. Students are introduced to career opportunities and skills needed to succeed in the specific hospitality and tourism fields. Students examine the growth and development of industry segments and their distinguishing characteristics, current issues and trends. Students will learn about the interdependence of the various industry players and the roles of these diverse participants within the industry. The concepts and practices of hospitality management are examined and discussed. **Lecture 3, Credits 3 (Fall)**

HSPT-284 HTM Marketing, Sales and PR
This course introduces students to hospitality marketing principles and sales techniques. Students will learn how to do effective hospitality-tourism industry market research, sales, and marketing plans. This course will provide students with an understanding of sales management and public relations practices used by hospitality professionals. Current trends in global marketplace distribution and effective hospitality and tourism industry promotional strategies will also be examined. Emphasis is placed on hospitality-tourism industry target marketing, marketing mix, analysis, product and image development, use of current media, sales planning, advertising, public relations, and collateral materials. (This class is restricted to undergraduate students with at least 2nd year standing.) **Lecture 3, Credits 3 (Spring)**

HSPT-315 Lodging Operations Analytics and Management
This class includes an overview of hotel management from its opening to continuing operations. It focuses on the integrated functions of the front office, housekeeping, engineering, security, food & beverage, human resources, and accounting, as well as considering their roles individually. Students will apply revenue management principles (e.g., capacity management, duration control, demand and revenue forecasting), costing (e.g., budgeting, marginal costing, standard costing and variance analysis, labor accounting, balanced scorecard) and interpret hospitality financial statements (uniform system of accounts for lodging and restaurants) to understand and manage organizational performance. The course addresses foundational metrics and definitions used by the hotel industry and provides an opportunity to complete a certification exam (CHIA: Certification in Hotel Industry Analytics) by STR through the American Hotel and Lodging Educational Institute. (Prerequisites: ACCT-110 and HSPT-225 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

HSPT-325 Food Innovation Development
Students will explore their creativity through instructor- and student-planned food experiments involving sensory and objective evaluation of food quality, recipe development, problem-solving, experimental design, and written and oral communication of research. Individual research projects focus on assessing new ingredients or technologies, creating new products, and/or evaluating the marketability of a new product. This course is not available for audit. **Fee: Lab fee associated with this course** (Prerequisite: HSPT-121 or HSPT-215 or equivalent course.) **Lec/Lab 6, Credits 3 (Fall, Spring)**

HSPT-334 International Resort Management
The course gives the student an understanding of how resorts and their recreational amenities are developed as tourist and business destinations. Focus is on the planning, development, operation, design, and special needs of golf, ski, marina, tennis, and spa operations. As part of this study, students select a specific type of property and analyze the methods used to develop, manage, and innovate the property's service offering. (This course is restricted to HSPS-BS and HSPS-AAS Major students.) **Lecture 3, Credits 3 (Spring)**

HSPT-335 Food and Beverage Management
This course will provide the student with the knowledge needed for the effective management of food service operations. Students will identify trends in the food and beverage industry, learn food and beverage management principles and understand how providing exceptional guest service can maximize profits in the hospitality industry. Topics will include food and beverage purchasing, inventory, costing, service styles, financial controls, menu design, sanitation, safety, ethics, food service automation, hardware and software, legal concerns, equipment selection, and service innovations in the design and layout of food establishments. (Prerequisite: HSPT-215 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

HSPT-336 Risk Management and HTM Law
The course examines the principles, tools, techniques, and methods employed in order to be effective in reducing the risk of liability in the hospitality setting. Students learn how to recognize, evaluate and control, and treat some of the risks associated with operating hospitality businesses. Students study hospitality based negligence cases, court decisions, and resulting judgments. Safety and disaster management issues will be addressed. (A minimum of 3rd year standing is required to enroll.) **Lecture 3, Credits 3 (Fall)**

HSPT-345 Food and Beverage Operations
Students will collaborate with the instructor in planning and managing a real restaurant, Henry's. Management skills emphasized will include menu development, costing, forecasting, marketing, food production, customer service, and plate presentation. Students will demonstrate knowledge and management skills in menu planning, costing, forecasting, sourcing, storage, staffing, customer service, food production techniques, timing, and food presentation while maintaining quality and contemporary appeal. (Prerequisites: HSPT-223 and HSPT-360 or equivalent courses.) **Lab 12, Credits 4 (Fall)**

HSPT-350 Event and Project Management
The meeting and event planner of today must know how to plan, execute, and evaluate any event to show value to the stakeholders. Meetings today help us celebrate meaningful events, change the way people behave, motivate employees to perform better, and solve problems by bringing together ideas from many different cultures. This course is designed to provide an introduction to the principles and concepts required for the management and execution of a successful event. Essential topics will include event planning, coordination, sponsorship, budgeting, programming, marketing, communications, vendor management, volunteer management, risk management, event research, and event evaluation. (A minimum of 3rd year standing is required to enroll.) **Lecture 3, Credits 3 (Spring)**

HSPT-360 Service Management and Quality Assurance
This course explores the unique characteristics and operations of service organizations: special characteristics and service problems. Students will learn principles of service and guest service management that can be used in managing any service organization. The course also introduces quality measurements associated with managing organizations in the service sector. (Prerequisites: HSPT-223 or equivalent course and at least 2nd year standing.) **Lecture 3, Credits 3 (Spring)**

HSPT-372 Hospitality Entrepreneurship in the Global Economy
Entrepreneurship in hospitality and tourism is recognized as providing many benefits, including economic growth, job creation, and innovation, to regions and economies. This course will provide an introduction and overview to entrepreneurship in the hospitality industry and the creation of new enterprises at the national, firm, and individual levels. Various models and case studies from the world of hospitality will be employed to analyze opportunities and to provide real world, global hospitality examples of relevant issues. Venture financing and entrepreneurial strategies for hospitality businesses will receive particular attention. Significant time will be devoted to translating entrepreneurs' (students') visions and identified hospitality-related opportunities into creating a business plan. This business plan will provide a blueprint for starting and running a new hospitality enterprise. The focus will be on developing a viable "real world" hospitality venture with practical considerations that is supported by financial modeling and projections. (Prerequisites: ACCT-110 or NACC-205 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

HSPT-374 Hospitality Enterprise Management and Growth
Enterprises in hospitality and tourism pass through many stages as they grow from a start-up to a mature organization. This course highlights what must be accomplished during each stage to ensure that hospitality business development is continued and sustainable. The critical point of the course is to give students an in-depth understanding of tools and skills necessary to create and grow a successful new tourism or hospitality enterprise with potential to expand. Students will actively discuss concepts and possible alternatives in operating hospitality- and tourism-based enterprises **Lecture 3, Credits 3 (Spring)**

HSPT-375**Customer Experience Management**

The overall objectives of this course are twofold. This course first examines the development, management, and improvement of service delivery systems used by service organizations (i.e., hotels, restaurants, travel agencies, and health care) on the supply side through the lens of quality management. Secondly, the course examines customer requirements on the demand side by focusing upon how customer experience design shapes customers' thoughts, actions, and decision processes. Students will learn techniques used for diagnosis, measurement, and continuous improvement of successful customer experience. There are three major sections in this course. Section 1 focuses on understanding the paradigm of customer experience, identifying the drivers of customer satisfaction, formulating strategies to optimize the customer experience, and managing service operations through the development of a service blueprint. Section 2 focuses on the role of exponential technologies, such as artificial intelligence, robotics, augmented reality, virtual reality, and data analytics, in creating exceptional customer experiences. Section 3 discusses the creation of exceptional luxury customer experiences, incorporating technology, and describing how brands go beyond traditional branding frameworks to create luxury experiences. **Lecture 3, Credits 3 (Fall)**

HSPT-376**Hospitality Luxury Service Excellence**

Luxury Service Excellence requires students to take one or more study trips as part of their experiential learning at RIT; this is a hands-on learning course that provides real-life examples of theoretic constructs. As hospitality luxury is highly experiential, taking students out of the classroom will allow them to more fully grasp it. Students will be exposed to one or more global luxury destinations, allowing them to experience and appreciate the complexity and demands of superior service delivery. Various luxury destinations such as Italy, Hungary, Croatia, Austria, United Arab Emirates (Dubai), would be excellent points of exploration. Students will be required to dive into the socio-cultural complexities of attaining luxury travel excellence, both from the point of view of product content and the necessities of product delivery processes. We will be exploring the cultural heritage as the backdrop for authenticity, but also global supply chains as the necessary elements for attaining it. We will explore how successful organizations build their products in terms of fashion/design, artisanship, food & beverage operations and how destinations reposition themselves to answer correctly to the challenges brought about by volatile and fast-changing global trends. Note that if travel abroad is restricted for any reason, course objectives will be achieved by visiting domestic and/or local luxury operations. Additionally, guest lectures and Q&A sessions delivered by hospitality luxury professionals will provide students with exposure to the evolving luxury dynamic. **Lecture 3, Credits 3 (Fall)**

HSPT-377**Hospitality Luxury Operations Design**

The exceptional and changing nature of high-end tourism (experiential, emotional, authentic, individualized, etc.) suggests that luxury tourism professionals require a unique set of skills. As such, this course will provide students with the theoretic foundations to luxury service design, preparing them to operate in today's luxury segment and enabling them to create and manage personalized experiences. Luxury service design is a holistic design process operating in the realm of constant uncertainty and change, i.e. chaos that arises from the contextual nature of personalized service and the ambition to solve problems that customers do not even know they have. Consequently, the chaos comes from the customers by default because they, by wanting personalization, resent standardization, which in turn means that organizations have to rearrange their stratagems in real time around what they hear from their clients. The luxury service design must therefore use skills from a variety of disciplines (design, psychology, management and process engineering) to develop models of co-creation of unique value with each individual customer, i.e. personalized experience in the process of continuous experimentation. Tools like market analysis, active listening, analysis of customer behavior, mapping, heat-mapping, blueprinting, service marketing, complex service networks and imagineering will help to discern the new opportunities for value creation in the convergence of customers' needs and desires, technological capabilities, and organizational innovations, taking customers beyond their current horizon of cognition. **Lecture 3, Credits 3 (Spring)**

HSPT-381**Technology in Service Systems**

Predicting the future... Adapting to change... Connecting and communicating... Lifelong learning... A fundamental societal revolution is changing the nature of work and leisure. Explore the emerging and future work worlds, consumer trends, and the technologies that are changing the way society works. Emphasis is on technologies impacting the food, hotel and travel service industries. Technologies explored may include those associated with communication, information retrieval, imaging, marketing, employee training, product quality, production customization, customer service, security, health, entertainment, and customer interface, as time permits. Student teams will chart the flow of product/service systems and identify innovative technologies to enhance the quality of service and creatively meet the needs of customers and emerging trends. Individual and team web sites will be constructed. **Lecture 3, Credits 3 (Fall, Spring)**

HSPT-384**HTM Strategic Financial Analysis**

This course provides future hospitality managers with necessary knowledge and skills in financial analysis, revenue management, and cost control to address financial issues specific to the hospitality-tourism industry. Students will understand how to apply revenue management tactics (e.g., capacity management, duration control, demand and revenue forecasting, discounting, overbooking practices, displacement analysis, rate management and sales mix analysis, and channel management revenue management tactics) to maximize profits. The course utilizes a mathematical approach to the evaluations of hospitality business performance. (Prerequisites: ACCT-110 or equivalent course and at least 3rd year standing.) **Lecture 3, Credits 3 (Spring)**

HSPT-399**Hospitality Part-time Co-op**

Career-related work experience. Employment within the food, hospitality or tourism service management industries is monitored by the International Hospitality and Service Management Program and the Office of Cooperative Education and Career Services. Coop work is designed for the student to experience progressive training on the job as related to the academic option. Freshmen begin co-op the summer following their first-year studies. Department permission is required. **CO OP, Credits 0 (Fall, Spring, Summer)**

HSPT-413**Restaurant Management**

This course is designed to develop entry-level competence in food system management. Students will operate a restaurant with full beverage service. The student will apply knowledge and skills gained from previous course prerequisites as they rotate through managerial positions. The student will be exposed to four major function areas: planning, organizational, leadership, and control functions. Computer (micros) utilization will be integral part of the course. (Prerequisites: FOOD-226 or equivalent course.) **Lab 12, Credits 4 (Fall, Spring)**

HSPT-420**Contemporary Issues in Sports and Entertainment Management**

Overview of the sports and entertainment industries through examination of contemporary issues faced by managers in these fields. Unique characteristics of these industries and resulting political, social, ethical, legal and economic responsibilities of managers are discussed using the case study method. (Prerequisites: HSPT-375 and MKTG-365 or MKTG-360 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

HSPT-444**Meeting and Event Management**

Meetings, incentives, conventions and events (MICE) industry continues to grow. Organizations stage events, hold conventions, celebrate achievements and motivate people. To respond to this complex demand, contemporary event planners must know how to plan, execute and evaluate any type of event. To be effective, they must go beyond traditional event production (design, catering, promotion, etc.) and understand broad skillsets such as service personalization, social media platforms, chatbots, artificial intelligence, virtual reality, augmented reality, etc. This course provides students the knowledge and skills required to plan, develop, and execute an event. This includes market research and financial planning. (AL2,3,4-DegS) **Lab 1, Credits 4 (Fall)**

HSPT-444**Meeting and Event Management**

Meetings, incentives, conventions and events (MICE) industry continues to grow. Organizations stage events, hold conventions, celebrate achievements and motivate people. To respond to this complex demand, contemporary event planners must know how to plan, execute and evaluate any type of event. To be effective, they must go beyond traditional event production (design, catering, promotion, etc.) and understand broad skillsets such as service personalization, social media platforms, chatbots, artificial intelligence, virtual reality, augmented reality, etc. This course provides students the knowledge and skills required to plan, develop, and execute an event. This includes market research and financial planning. (AL2,3,4-DegS) **Lecture 3, Credits 4 (Fall)**

HSPT-450**Strategic Planning and Decision-Making**

This course concentrates on the strategic planning process, strategy implementation, and strategic control approaches to strategic management in a hospitality context. This course integrates previous courses in the curriculum and introduces students to new strategic management concepts. (This course is restricted to students with at least 4th year standing in HSPS-BS.) **Lecture 3, Credits 3 (Fall)**

HSPT-454**Food Processing, Quality, and Integrity**

Traditional and contemporary processing methods will be introduced with emphasis on applications to food retail operations. The effect of these technologies on the storage life and sensory qualities of the products will be examined along with common modes of loss of quality in foods. Students will be introduced to industry-standard quality assurance measures. **Lecture 3, Credits 3 (Spring)**

HSPT-485 **Restaurant and Event Management**
Students guided by the instructor will manage Henry's, a restaurant operating during the semester and open to the public. Management skills emphasized will include menu development, costing, forecasting, marketing, food production, customer service, and plate presentation. Students will use these skills to deliver quality service maintaining food safety and cost standards. Students will also learn how to execute discrete events. (Prerequisites: HSPT-335 and HSPT-375 or equivalent courses.) **Lec/Lab 12, Credits 4 (Fall)**

HSPT-489 **Special Topics**
This is an innovative course not currently in the approved curriculum. When the topic and course outline are approved by the department chair, the course will be available to students for registration. The course may be taken more than once since many topics can be offered under this course number and title. **Lecture 3, Credits 1 - 3 (Fall, Spring)**

HSPT-495 **Hospitality Project Planning and Development**
This course focuses on the processes in the development of hospitality projects. This course will introduce students to the process of developing hospitality projects (i.e., hotel, restaurant, resort, spa) by conducting site analyses and feasibility studies, distinguishing among ownership entities, recognizing differences among franchise and management company, identifying financing options, budgeting, scheduling, and planning operations. Students will interact with a hospitality-related organization to gain practice in conducting a consulting project. (Prerequisites: HSPT-315 and HSPT-335 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

HSPT-499 **HSPT Co-op**
Career-related work experience. Employment within the food, hospitality or tourism service management industries is monitored by the International Hospitality and Service Management Program and the Office of Cooperative Education and Career Services. One co-operative work experience may be replaced by a study abroad semester. Coop work is designed for the student to experience progressive training on the job as related to the academic option. Freshmen begin co-op the summer following their first-year studies. Graduation requirement: 3 coops. Department permission is required. (Academic Level 1 thru 4, Degree Seeking students.) **CO OP, Credits 0 (Fall, Spring, Summer)**

HSPT-518 **Global Tourism**
Students will prepare for travel to a foreign country by learning about cultural expectations of the region in class before traveling to the selected region to explore their customs and culture, prime tourism attractions, and foods. Through a one-week study tour, students will be exposed to speakers and sites that represent the policies and development that have given rise to tourism development in such locations as Dubai, Croatia, Italy, and other countries of current interest. Some example emphases might be: Dubai with anticipated site visits to include the Palms projects, Jumeirah Hotels and Resorts, Ski Dubai and new transportation projects. Cultural difference between traditional western models of management, policy and development will be compared to examples in the Middle East. The influence of Arab culture and Muslim practices on tourism and tourists in this region, and the economic impact of tourism growth in Dubai will be explored through guest speakers. In Croatia the re-invention of tourism in a country after a war, and the key role of tourism in economic development will be explored, along with local tourism and culture. **Lecture 3, Credits 1 - 4 (Fall)**

HSPT-599 **Independent Study**
This course provides for independent study in approved subject areas that have specialized value to students. Proposals for independent study must be approved by a supervising faculty member prior to registration. This course may be taken more than once. **Ind Study, Credits 1 - 3**

Human Resource Development

HRDE-380 **Human Resource Management**
Human resources within an organization provide value added dimensions to the organization, which in turn influence the larger society within which the organization exists. The management of those human resources is a critical function within any organization. The goal of the human resource management (HRM) department is to attract qualified employees, manage systems that meet their needs and establish policies and protocols to retain and promote employee engagement. This effort develops a workforce that can meet the organizational strategic goals for growth and continued relevance in the world of work. This course provides an overview of HRM and the context within which HRM functions in organizations. **Lecture 3, Credits 3 (Fall, Spring)**

HRDE-383 **Employee Benefits and Compensation**
A total rewards program within an organization develops and aligns a reward strategy for employees to reinforce the behavior and performance required to support the organizations overall strategy. This course identifies what rewards are, both tangible and intangible, including compensation and benefits. Using the information a rewards program is built reflecting existing business conditions and cost constraints. This program is used as an organizational strategy to satisfy personal and financial needs of the current and future workforce. **Lecture 3, Credits 3 (Spring)**

HRDE-386 **Human Resources Development**
A one-semester, three-credit course in human resource development provides the prospective manager practical information on methods to enhance the productivity, quality, and effectiveness of an organization through the creation of an environment where individual and collective performance and development has primacy. The course requires students to assimilate course material related to the following: to organizational strategy, systems thinking and legal compliance; workforce development, career development of employees; individual development and training; measuring outcomes; human resource processes and effective communications. Students integrate theoretical classroom concepts with practical knowledge and work experiences. As part of the course: students continually practice effective communication skills; students may work in teams; and are expected to engage in critical and innovative thinking. Students' understanding of human resource development is intended to help them enhance organizational effectiveness through implementing processes designed to develop and train employees. **Lecture 3, Credits 3 (Fall, Spring)**

HRDE-387 **Human Resource Employment Law and Regulations**
Employment law and regulations govern how the workforce functions. Adherence to the law can raise questions due to context of the situation and applicability of the law to a variety of situations. This course will explain employment laws and regulations as they apply to a variety of workplaces and interpret how these laws and regulations require compliance through the practice of human resource management. **Lecture 3, Credits 3 (Fall)**

International Business

INTB-225 **Global Business Environment**
Being an informed global citizen requires an understanding of the global business environment. Organizations critical to the development of the global business environment include for-profit businesses, non-profits, governmental, non-governmental, and supranational agencies. This course introduces students to the interdependent relationships between organizations and the global business environment. A holistic approach is used to examine the diverse economic, political, legal, cultural, and financial systems that influence both organizations and the global business environment. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 3, Credits 3 (Fall, Spring)**

INTB-300 **Cross-Cultural Management**
This course explores the key implementation issues facing global businesses and those firms wishing to expand into the global arena. An emphasis is placed on issues related to the topic of culture. The course examines its impact on management, individuals, groups, and how it affects organizational performance. Leadership styles, in the cross-cultural context, will be deconstructed as will communication, decision-making, negotiation, and motivation. (Prerequisites: INTB-225 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

INTB-310 **Regional Business Studies**
An introduction to the most important and the fast growing economic entities to the students such as the European Union, China, India, and Brazil. The course introduces the idiosyncratic competitive environment in these major economies, the unique business models of the local ventures, and the business opportunities and the hidden risks in these markets. The course will also develop students with the necessary knowledge base and skills to compete with and in these major economies. (Prerequisites: INTB-225 or equivalent course.) **Lecture 3, Credits 3 (Biannual)**

INTB-315 **Exporting and Global Sourcing**
The practice of international business is detailed-oriented and complex as cross-border trade and investment is subject to various market forces and government regulations. In this course students will study the issues of compliance, risk assessment, sources of international information, logistical complexities and intermediaries, and international payments and financing. The course will develop students with the necessary knowledge base and skills to become successful in the practice of cross border transactions. (Prerequisites: INTB-225 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

INTB-399 **International Business PT Co-op**
Half semester of paid work experience in international business. (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Fall, Spring, Summer)**

INTB-480**Specialized Topics in Global Business**

This course is designed to educate students on how to conduct business in a foreign region or a global industry in depth. After taking this class, students should have a thorough understanding of how to conduct business associated with this specific region or the global industry. (This class is restricted to undergraduate students with at least 2nd year standing.) **Lecture 3, Credits 3 (Spring)**

INTB-488**Intl. Bus Co-op Summer**

One summer semester of paid work experience in International Business. (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Summer)**

INTB-489**Seminar in International Business**

Current issues in IB are the focus of the course. Topics include but not are limited to current international business trends, development, and other topics at the instructor's discretion. (Prerequisites: INTB-225 or equivalent course and 3rd year standing.) **Lecture 3, Credits 3 (Fall)**

INTB-499**International Business Co-op**

One semester of paid work experience in International Business (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Fall, Spring, Summer)**

INTB-550**Competing Globally**

This course explores the opportunities and challenges businesses encounter creating and capturing value in the global environment. Areas of emphasis include: forecasting markets; why firms globalize; analyzing global competitors; the degree of globalization or regionalization; creating value for the firm globally which includes entry mode management, location decisions and timing, role of technology; and how to operate. (Prerequisites: INTB-225 or equivalent course and 4th year standing.) **Lecture 3, Credits 3 (Spring)**

Management

MGMT-101 Business 1: Introduction to Business Communication, Planning and Analysis

This is the first of a two-course sequence, 4 credit year long experience, comprising the freshman-integrated experience. In Business 1, students will be introduced to the key functional areas of business, discuss current factors, events, and trends that impact business, build professional, personal leadership, communication, and teamwork skills, and evaluate business decisions, and the business plan process. By understanding the key functions of business and analyzing business decisions in Business 1, students will be able to then develop their own business ideas in Business 2. (Co-requisite: MGMT-101 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

MGMT-102**Business 2: Business Planning and Professional Development**

This course, the second in the First-year Business 4 Credit Experience, applies business and technology tools to create a modified business plan. Supported by guest speakers on a variety of professional development topics, along with student and professional mentors, students in this project-centered course use the Business Model Canvas innovation tool and learn to identify and communicate the nine key elements of a business model. Students will complete a team project that outlines the business case for a new product or service to address a selected challenge or opportunity. Student teams present a business case in both a one-page document and a 10-minute presentation pitch. (Prerequisites: MGMT-101 or MGMT-150 or equivalent course.) **Lecture 1, Credits 1 (Fall, Spring)**

MGMT-103**Business 2T: Business Planning Tools and Practices**

This course is designed to provide transfer students the experience of developing a new business concept from ideation through launch. It will provide an emphasis on Design Thinking. Students will work in teams to develop a new business idea. They will then put together a detailed business plan integrating the key functional business elements into a cohesive plan for launch. (Prerequisites: MGMT-150 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

MGMT-150**Business 1T: An Introduction to Business**

Designed as an introductory business course for students in the Saunders College that want to learn more about the fundamentals of business. This course provides an overview of the functions and processes of business organizations. Topics include the role and responsibility of the manager, the processes and functions of business, the impact of technology, business planning process, doing business in global environments, and career exploration. NOTE: Students may not take MGMT 150 if they have already taken MGMT 101 and MGMT 102. (Students may not take MGMT-150 if they have already taken MGMT-101 and MGMT-102.) **Lecture 3, Credits 3 (Fall, Spring)**

MGMT-215**Organizational Behavior**

As an introductory course in managing and leading organizations, this course provides an overview of human behavior in organizations at the individual, group, and organizational level with an emphasis on enhancing organizational effectiveness. Topics include: individual differences, work teams, motivation, communication, leadership, conflict resolution, organizational culture, and organizational change. (This class is restricted to undergraduate students with at least 2nd year standing.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

MGMT-300**Leading People and Effective Communication I**

Air Force Management and Leadership (AS 300) courses emphasize the concepts and skills required of the successful young officer, manager and leader. The first course includes applied written and oral communication techniques, coordination, and history of management theory, analytic methods of decision making, strategic and tactical planning, various leadership theories and followership. The second course stresses organizing, staffing, controlling, counseling, human motivation and group dynamics, ethics, managerial power and politics, managing change, career development, and performance appraisal. Actual Air Force case studies are used to enhance the learning process. *Note: This course is restricted to AF ROTC Students. **Lecture 3, Credits 3 (Fall)**

MGMT-301**Leading People and Effective Communication II**

Integrated management and leadership courses emphasize the concepts and skills required of the successful young officer, manager, and leader. The first course includes applied written and oral communication techniques, coordination, history of management theory, analytic methods of decision-making, strategic and tactical planning various leadership theories, and followership. The second course stresses organizing, staffing, controlling, counseling, human motivation and group dynamics, ethics, managerial power and politics, managing change, career development, and performance appraisal. Actual Air Force case studies are used to enhance the learning process. *Note This course is restricted to AF ROTC Students. (Prerequisites: MGMT-300 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MGMT-310**Leading Cross-Cultural and Virtual Teams**

Taught in an experiential, team-based format, this class focuses on leading cross cultural and virtual teams, with an emphasis on developing strong team dynamics for effective performance in a global environment. Thus, class topics will center around understanding team development and leading teams, while considering varying relevant factors such as cultural differences, virtual communication, managing conflict, and team climate/trust, among others. The course will provide hands-on experience in leading and participating in teams as students will be assigned to a team and will take on different roles, including team leader. When possible, the class includes a virtual team project with students at RIT's global campuses. (Prerequisites: INTB-225 and MGMT-215 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

MGMT-320**Organizational Effectiveness Skills**

This course provides students with working knowledge and practice of the professional and interpersonal skills of effective organizational members. Skills include networking, presenting, professional writing, giving and receiving feedback, handling conflict, and leveraging diversity. Particular emphasis is placed upon applying these skills in a virtual work environment. (Prerequisites: MGMT-215 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

MGMT-330**Design Thinking and Concept Development**

Design thinking is a process that aids collaboration among designers, technologists, and business professionals. The process provides a structured creative process for discovering and developing products, services, and systems for profit and non-profit applications. Students will apply a wide range of design tools in a hands-on project. Topics include problem-framing, end-user research, visualization, methods for creative idea generation, and prototyping. (This class is restricted to undergraduate students with at least 3rd year standing.) **Lecture 3, Credits 3 (Fall, Spring)**

MGMT-340**Business Ethics and Corporate Social Responsibility**

This course applies concepts of ethics to business at the macro level and at the micro level. At the macro level the course examines competing business ideologies exploring the ethical concerns of capitalism as well as the role of business in society. At the micro level the course examines the role of the manager in establishing an ethical climate with an emphasis on the development of ethical leadership in business organizations. The following topics are typically discussed: the stakeholder theory of the firm, corporate governance, marketing and advertising ethics, the rights and responsibilities of employees, product safety, ethical reasoning, business's responsibility to the environment, moving from a culture of compliance to a culture of integrity, and ethical leadership. (This class is restricted to undergraduate students with at least 2nd year standing.) **Lecture 3, Credits 3 (Fall, Spring)**

MGMT-340H Business Ethics and Corporate Social Responsibility - Honors
This course applies concepts of ethics to business at the macro level and at the micro level. At the macro level the course examines competing business ideologies exploring the ethical concerns of capitalism as well as the role of business in society. At the micro level the course examines the role of the manager in establishing an ethical climate with an emphasis on the development of ethical leadership in business organizations. The following topics are typically discussed: the stakeholder theory of the firm, corporate governance, marketing and advertising ethics, the rights and responsibilities of employees, product safety, ethical reasoning, business's responsibility to the environment, moving from a culture of compliance to a culture of integrity, and ethical leadership. (This class is restricted to undergraduate students with at least 2nd year standing.) **Lecture 3, Credits 3 (Fall, Spring)**

MGMT-350 Entrepreneurship
This course studies the process of creating new ventures with an emphasis on understanding the role of the entrepreneur in identifying opportunities, seeking capital and other resources, and managing the formation and growth of a new venture. It addresses the role of entrepreneurship in the economy and how entrepreneurial ventures are managed for growth. (This class is restricted to undergraduate students with at least 3rd year standing.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

MGMT-360 Digital Entrepreneurship
Digital Entrepreneurship brings together state-of-the-art knowledge in digital business practices with basic instruction in entrepreneurship and business planning. This highly interactive, applied experience will allow students to develop business ideas, discover RIT resources that support new ventures, network with and learn from industry experts, and complete a professional plan to communicate and advance a digital business venture. Student work for this course will involve research and analysis of electronic marketplaces and, ultimately, the design and development of competitive digital startups. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

MGMT-370H Honors Leadership Behaviors for Personal and Professional Success
This course will introduce students to personal leadership and professional leadership concepts and exercises that will assist students in developing the skills and behaviors needed for success in the workplace. Personal leadership skills will focus on self-awareness of strengths and areas for development, differences in communication and work style and how to adapt, emotional intelligence strategies, values and decision making, as well relationship building, networking, and influencing others. The professional leadership concepts will focus on the skills needed to effectively lead others and solve workplace challenges, including developing trust and credibility, creating a shared vision, managing change, influencing a positive work culture, and motivating and empowering others. Students will analyze current leaders and challenges as well as network and engage with speakers who serve as leaders in a variety of industries. (This class is restricted to undergraduate students with at least 3rd year standing.) **Seminar 3, Credits 1 (Fall, Spring)**

MGMT-399 Management PT Co-op
Half semester of paid work experience in management. (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Fall, Spring, Summer)**

MGMT-420 Managing Innovation and Technology
This course focuses on commercializing technology, and gives students the chance to work on real business projects involving new technology. Topics covered include assessing inventions for market readiness, drivers of innovation, technology-driven entrepreneurship and intrapreneurship, managing different types of innovation, and the construction of a technology strategy for a firm or business unit. Students learn how to understand both technology and business perspectives as well as how to formulate a profitable technology strategy. Projects focus on current situations in real companies, including, on occasion, student-owned startup companies. (This class is restricted to undergraduate students with at least 3rd year standing.) **Lecture 3, Credits 3 (Fall, Spring)**

MGMT-450 Negotiations and Decision-Making
This course is designed to improve your ability to negotiate by understanding decision-making biases that affect the negotiated outcome. Individual sessions will explore the structure and strategies to mitigate risks and challenges inherent in achieving optimal solutions. (Prerequisites: MGMT-215 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MGMT-470 Applied Entrepreneurship and Commercialization
This unique undergraduate course enables students to learn the entrepreneurial (value creation) process by advancing a business idea. The course provides weekly seminars focusing on customer discovery and business model development and weekly coaching mentoring sessions with an established entrepreneur/early stage marketer. The project is team based. Students may enter the course with a business concept or be integrated into an existing team in the course. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

MGMT-488 Management Co-op Summer
One summer semester of paid work experience in management. (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Summer)**

MGMT-489 Seminar in Management
Special-topics seminars offer an in-depth examination of current events, issues and problems unique to management. Specific topics will vary depending upon student and faculty interest and on recent events in the business world. Seminar topics for a specific semester will be announced prior to the course offering. These seminars may be repeated for credit since topics normally vary from semester to semester. (topic-dependent) **Lecture 3, Credits 3**

MGMT-499 Management Co-op
One semester of paid work experience in management. (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Fall, Spring, Summer)**

MGMT-550 Real World Business Solutions
Students nearing the completion of their program work in consulting teams to assist startup ventures, small businesses, or other clients from within RIT. Problems are isolated and solutions then developed. Affiliated course projects may focus on a number of areas. For example, they may seek to develop commercialization plans for specific technologies, products, or services; focus on unique problems associated with small businesses, and develop growth strategies. Students also complete an integrative paper that applies previous coursework to this project. (This class is restricted to undergraduate students with at least 4th year standing.) **Lecture 3, Credits 3 (Fall)**

MGMT-551 Technology Entrepreneurship (for Engineers/STEM Students)
This course explores the unique processes, skills, functional disciplines and concepts associated with Technology Entrepreneurship from the perspective of an engineer or technologist. It emphasizes the entrepreneurial process from start to finish—but with an emphasis on the “getting started phase”. This course addresses the unique challenges of technologists starting companies from opportunity recognition, product/service creation, value capture through innovation, and the importance of technology-based innovation for the establishment and growth of the new venture in global products and services industries. **Lecture 3, Credits 3 (Fall, Spring)**

MGMT-560 Strategic Management
A capstone course drawing upon major business functions—accounting, finance, marketing, operations management, and organizational theory and how strategic managers integrate functional theories and concepts to create competitive advantage. The course provides an integrated perspective of business organizations toward the achievement of enhanced profitability and a sustainable competitive advantage. Topics include the analysis of business environments, industry attractiveness, and competitive dynamics. Students learn how to formulate and implement effective business-level, corporate-level, and global strategies using theories, cases and a simulation. (Prerequisites: MGMT-215 and MKTG-230 and FINC-220 and DECS-310 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

MGMT-599 Independent Study Management
The student will work independently under the supervision of a faculty adviser. *Note: Instructor approval. **Ind Study 3, Credits 3 (Fall, Spring, Summer)**

Management Information Systems

MGIS-101 Computer-based Analysis
This course provides students with hands-on experience with the analytical software tools and techniques that are used in today's businesses. Emphasis will be placed on the application of spreadsheet models for supporting management decision-making. A variety of spreadsheet-based cases in market research, financial analysis, accounting applications and other business domains will be utilized to show how to effectively analyze and solve business problems using the spreadsheet tool. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 1, Credits 1 (Fall)**

MGIS-130 Information Systems and Technology
To be successful in our globally-networked business environment, contemporary management professionals must have a strong grounding in the principles of information and information technology. This course provides an introduction to the field of management information systems (MIS), including the tools and techniques for managing information and information technologies within organizations. We place a particular emphasis on the nature of systems, the role of information in business processes, the management of data, and the planning of MIS design projects. **Lecture 3, Credits 3 (Fall, Spring)**

MGIS-320 Database Management Systems
Transforming data into information is critical for making business decisions. This course introduces students to the concepts of data, information and the business database management systems (DBMS) used by modern organizations. Exercises and hands-on projects are used to model the information needs of an organization and implement and query databases using applications such as Microsoft Access and SQL. **Lecture 3, Credits 3 (Fall, Spring)**

MGIS-330**Systems Analysis and Design**

Successful organizations utilize a systematic approach to solve real-world business problems through the use of computing resources. Students who complete this course will be able to design and model business processes. They will learn how to conduct requirements analysis, approach the design or redesign of business processes, model system functions, effectively communicate systems designs to various levels of management, work in a project-based environment, and approach the implementation of a new organizational information system. **Lecture 3, Credits 3 (Fall, Spring)**

MGIS-350**Developing Business Applications**

Development of business applications is transforming from programming to integration of software components using application development environments. Students learn the fundamentals of computer programming and applications development through a set of programming exercises that focus on visual development environments and component integration. These exercises expand into a project where students apply concepts of typical development and project methodologies to complete a comprehensive programming assignment. **Lecture 3, Credits 3 (Spring)**

MGIS-355**Business Intelligence**

The course is intended to provide an integrative foundation in the field of business intelligence at both the operational and strategic levels. Students will experience a variety of contemporary tools to analyze complex business data and arrive at a rational solution. Topics such as data warehousing, visualization and data mining will be covered, along with other topics relevant to the field of business intelligence. The computer will be used extensively throughout the course. (Prerequisites: MGIS-350 and MGIS-320 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

MGIS-360**Building a Web Business**

This course gives students both a conceptual and hands-on understanding of the launching of web businesses. Students will study the full process of web business creation, including domain name registration, frameworks for application creation, hosting of web applications and search engine optimization. Students will apply their knowledge by designing and building a business website that can actually make money. **Lecture 3, Credits 3 (Fall, Spring)**

MGIS-381**HTM Information Systems and Analytics**

This course emphasizes the use of quantitative and analytical skills, technology and data analytics in HTM management problem solving and decision making. Taking a systems approach, topics include HTM technology system relationships and dynamics, data mining, using relevant data in HTM decision making, HTM-related technology, software, tools and hospitality technology trends, including self-service applications, web-based applications, and transaction processing technologies. **Lecture 3, Credits 3 (Fall)**

MGIS-399**Management Information Systems PT Co-op**

Half semester of paid work experience in management information systems. (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Fall, Spring, Summer)**

MGIS-415**Object-oriented Business Programming**

Object-oriented Programming (OOP) will prepare students to plan and implement systems using the object-oriented approach. This course will build on earlier programming classes, and will emphasize the programming practices of polymorphism, inheritance, and data hiding. (Prerequisites: MGIS-350 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

MGIS-425**Database Systems Development**

This course builds upon the basic concepts from Database Management Systems. Students work in a real-world business database development environment and gain hands-on experience in advanced database querying language, such as Oracle PL/SQL. Students learn to analyze business processes and, using tools such as Oracle, develop fully functioning database prototype systems to support them. (Prerequisites: MGIS-320 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

MGIS-429**Cyber: Risk and Resilience**

This course provides a conceptual and practical overview of Cybersecurity Management. A keen awareness of the principles and procedures of cybersecurity is a management necessity with universal business implications. Success in today's global economy requires a focus on cybersecurity strategy and management with governance as an overarching consideration in all risk assessment and management related endeavors. **Lecture 3, Credits 3 (Fall, Spring)**

MGIS-445**Web Systems Development**

Students in this class will analyze business problems and develop data-driven web applications to solve them. An industry-level application server will provide the framework for integrating and deploying a set of client and server technologies to create these applications. Development skills will include presenting and receiving information through a website, validating entered information, and storing entered information in text files or databases. Students will design solutions using Hypertext Markup Language, client scripting and server programs for database and file access. (Prerequisites: MGIS-350 and MGIS-320 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

MGIS-450**Enterprise Systems**

This course explores the role of enterprise resource planning (ERP) systems in organizations. Students analyze cross-functional business processes and ERP systems commonly used to support these processes. Students engage in a hands-on project using a current ERP system, such as SAP R/3, to demonstrate, analyze and design system structures, key data elements and process configurations that support cross-functional business processes, including accounting, sales, material management, production and distribution. **Lecture 3, Credits 3 (Fall)**

MGIS-488**Mgmt. Info. Sys. Co-op Summer**

One summer semester of paid work experience in management information systems. (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Summer)**

MGIS-489**Seminar in MIS**

Advanced study of MIS topics reflecting contemporary issues and/or current technological advancements impacting the development, implementation and management of information systems in organizations. Seminar topics have ranged from new technological developments to management security issues in MIS systems. Topics for a specific semester will be announced prior to the course offering. **Lecture 3, Credits 3 (Fall, Spring)**

MGIS-499**Management Information Systems Co-op**

One semester of paid work experience in management information systems. (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Fall, Spring, Summer)**

MGIS-550**MIS Capstone**

This capstone course for MIS majors applies the concepts of project management and techniques for estimating, planning and controlling of resources to accomplish specific project goals. Students complete a team project requiring them to develop an innovative information system while utilizing project management techniques. Students analyze real business situations and develop IT-based innovative solutions for problems encountered. (Prerequisites: MGIS-320 and MGIS-330 or equivalent courses and 4th year standing.) **Lecture 3, Credits 3 (Fall, Spring)**

MGIS-589**Hacking for Defense (H4D)**

Students work with multidisciplinary teams to solve real problems for the United States government, as well as critical infrastructure partners in the Healthcare, Finance, and Energy sectors, through the Hacking for Defense initiative (www.H4Di.org). Students will build a foundation in requirements elicitation through structured interview. Students learn lean launchpad methods to define problems and design technology and/or service innovations, ultimately leading to well-grounded opportunities for follow-on commercialization and academic research. (Prerequisites: MGIS-330 and MGIS-350 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

MGIS-599**Independent Study Management Information Systems**

The student will work independently under the supervision of a faculty advisor. (Instructor approval) **Ind Study 3, Credits 3 (Fall, Spring, Summer)**

Marketing**MKTG-230****Principles of Marketing**

An introduction to the field of marketing, stressing its role in the organization and society. Emphasis is on determining customer needs and wants and how the marketer can satisfy those needs through the controllable marketing variables of product, price, promotion and distribution. (This class is restricted to undergraduate students with at least 2nd year standing.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

MKTG-310**Marketing Research**

Marketing research focuses on methods used to understand the changing needs of customers and markets to guide the decision-making of managers. The course emphasizes the data-driven elements of the marketing research process. Through hands-on methods, students will work through research problem formulation, data sources, data collection methods, and analysis. (Prerequisites: MKTG-230 and STAT-146 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

MKTG-320

Digital Marketing

Internet marketing is critical to an organization's overall strategy. This course focuses on tactics and strategies that enable marketers to fully leverage the internet. Topics include the overall internet marketing landscape, technologies, customer segmenting and targeting, search, analytics and emerging internet-marketing platforms. (Prerequisites: MKTG-230 or NBUS-227 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

MKTG-330

Global Marketing

A hands-on course focusing on developing marketing strategies for entering and competing in foreign countries. Topics include foreign market opportunity assessment, developing commercialization and entry strategies, understanding foreign customers and distribution channels, and communicating value through advertising and promotion in different markets. (Prerequisites: MKTG-230 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

MKTG-350

Consumer Behavior

A study of the determinants of buying behaviors. Emphasis is on identifying target markets and customer needs, internal and external influences on lifestyle and understanding the buying decision process. (Prerequisites: MKTG-230 or NBUS-227 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

MKTG-360

Professional Selling

Selling concepts, tools, strategies, and tactics are discussed as they apply to both external and internal customers. Students learn and experience some of problems faced and rewards earned by those in professional sales. Customer relationship management/partnering with customers and truly seeking to meet their requirements are discussed as key to long-term success. (Prerequisites: MKTG-230 or NBUS-227 or equivalent course and 3rd year standing.) **Lecture 3, Credits 3 (Fall, Spring)**

MKTG-365

Marketing Analytics

Marketing analytics is the practice of measuring, managing and analyzing marketing performance to maximize its effectiveness and optimize return on investment (ROI). Understanding marketing analytics allows marketers to be more efficient at their jobs and minimize wasted online and offline marketing dollars. It also provides marketers with the information necessary to help support company investment in marketing strategy and tactics. This course provides the participant with the necessary knowledge and practical insights that will help a marketing manager get more out of available data and take strategic advantage of the analysis. This interactive, participatory course is designed to answer key questions: "What is marketing analytics, how can marketing analytics improve my marketing efforts and how can I integrate marketing analytics into my business?" (Prerequisites: MKTG-230 and STAT-145 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

MKTG-370

Advertising and Promotion Management

An in-depth view of tools of promotion management: advertising, sales promotion, public relations, personal selling, direct marketing and internet marketing as well as new and alternative media. Basic concepts of how to use print, broadcast, internet and out-of-home media are studied. Planning, budgeting, creative strategy, and the roles of advertising agencies are also covered. (Prerequisites: MKTG-230 or NBUS-227 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

MKTG-399

Marketing PT Co-op

Half semester of paid work experience in marketing. (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Fall, Spring, Summer)**

MKTG-410

Search Engine Marketing and Analytics

An examination of search engine marketing strategies to maximize site traffic, lower customer acquisition costs and boost conversion rates. Marketing frameworks provide the basis for the hands-on examination of search engine marketing and web analytics. (Prerequisites: MKTG-320 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

MKTG-420

Advanced Internet Marketing

An advanced course that gives students an in-depth knowledge of internet theories, marketing problems, and processes. The course will enable students to critically evaluate the internet marketing planning process. It integrates the core principles, tools, and tactics necessary to succeed online. (Prerequisites: MKTG-410 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

MKTG-430

Social Media Marketing

This course introduces the student to the general theories of Social Media Marketing and its relevance and importance as a Marketing tool. The student will learn how to create campaigns and the strategies and tactics in the most popular social media platforms, as generate reports and actions based on social media analytics. (Prerequisites: MKTG-230 or NBUS-227 or equivalent course and 3rd year standing.) **Lecture 3, Credits 3 (Fall, Spring)**

MKTG-488

Marketing Co-op Summer

One summer semester of paid work experience in marketing. (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Summer)**

MKTG-489

Seminar in Marketing

Current issues in marketing are the focus of the course. Topics have included direct and database marketing, pricing, advanced marketing research and other current issues in marketing based on student and faculty interest. (Prerequisites: MKTG-230 or NBUS-227 or equivalent course and 3rd year standing.) **Lecture 3, Credits 3**

MKTG-499

Marketing Co-op

One semester of paid work experience in marketing. (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Fall, Spring, Summer)**

MKTG-550

Marketing Strategy

A capstone course that gives the student an in-depth knowledge of middle- and upper-management-level marketing problems and processes. Topics include tools used by marketing managers in the development, implementation and control of marketing plans. * Note: A completed co-op (MKTG-499) is required. (Prerequisite: MKTG-230 and MKTG-499 or MKTG-399 or MKTG-488 or equivalent course and 4th year standing.) **Lecture 3, Credits 3 (Fall, Spring)**

MKTG-599

Independent Study Marketing

The student will work independently under the supervision of a faculty adviser. (Instructor approval.) **Ind Study 3, Credits 3 (Fall, Spring, Summer)**

Service Quality

SERQ-420

Service Quality

Those involved in service professions should be aware of the role quality plays in the industry. This course will allow students to understand how quality initiatives benefit clients and customers, employees, and the organization. Students will explore and apply the concepts of quality management, and process control and improvement. To accomplish these students will review and apply the commonly used quality tools and techniques for problem solving and process improvement. This is a required core course in the applied technical leadership degree. Course is available to undergraduate students only on a space available basis and if ATL admission requirements of associate degree and three years full-time work experience is satisfied with department permission. (This class is restricted to students with at least 4th year standing in ATLEAD-BS.) **Lecture 3, Credits 3 (Fall)**

Golisano College of Computing and Information Sciences

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Course numbering: RIT courses are generally referred to by their alphanumeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100-299), upper division (300-599), or graduate level (600 and above).

Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.

Computing Exploration

CINT-091

The Entrepreneurial Mindset

Entrepreneurial activities drive the new economy. This course is open to all STEM students, as it is likely that they will be involved in entrepreneurial activities at some time in their careers. This might be when they have identified a compelling idea, it might be when a colleague starts a business and needs their expertise for the founding team, or it could be the result of an economic shift. The course discusses what it takes to be a successful entrepreneur or a member of a founding entrepreneurial team. It looks at the different contributions of technology, risk-taking, customer interactions, management, and fundraising. **Lecture 1.5, Credits 0 (Fall, Spring)**

CINT-101

Computing Exploration Seminar

A one credit-hour course for the Computing Exploration students, including an overview of the computing disciplines and an introduction to seven computing and informatics academic programs: Computer Science, Computing and Information Technologies, Computing Security, Human-Centered Computing, New Media Interactive Development, Software Engineering, Web and Mobile Computing, as well as a few other computing programs outside the college. Curricula requirements of the seven programs and career opportunities in the computing fields are discussed. Potential employers discuss job opportunities. Introductions to the faculty, students, and laboratory facilities of the seven programs are provided. Cooperative education, study abroad, and innovation fellowship program opportunities available to the students are explored. **Lecture 1.25., Credits 1 (Fall)**

CINT-112

Computing with Data

This course is designed to introduce students to the central ideas of computing with data. Students will engage in activities that will teach them how to develop programs that manipulate and analyze data to inform. Students will work with structured and unstructured data and learn how to use tools to visualize patterns in data. Students will study the social, ethical and privacy issues associated with collecting and analyzing data. Students will be required to demonstrate oral and written communication skills through such assignments as short papers, homework, group discussions and debates, and the development of a substantial program to analyze a data set of their choice. Computing majors may take this course only with department approval, and may not apply these credits toward their degree requirements. (Prerequisites: CSCI-101 or CINT-110 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

CINT-118

Themes in Computing

A one credit-hour course for incoming computing students, featuring lectures and discussion of important themes in computing. A different theme is presented during each session. Example topics might include: history of the field, developments in research, and societal changes caused by computing. Students will meet current faculty who will provide lectures and discussion of a variety of themes. This course will help provide orientation to the breadth of the modern computing field. **Lecture 2, Credits 1 (Summer)**

CINT-151H

Honors Seminar

This honors seminar is a foundational course that examines how our social worlds are linked to our physical and material worlds. The corresponding emphasis on inquiry, analysis, and interpretation facilitates student-engaged learning. In exploring pertinent issues/topics through an experiential, active, and site-specific curricular focused learning, various aspects of the human condition are discovered. The theme or topic of this honors seminar, as chosen by the instructor, is announced in the subtitle as well as course notes and is developed in the syllabus. The honors seminar integrates the required YearOne curriculum. **Lecture 1, Credits 0 (Fall)**

Computer Science

CSCI-099

Undergraduate Cooperative Education Seminar

This seminar helps students prepare for Computer Science co-operative education employment ("co-op") by developing job search strategies and materials, and reviewing relevant policies. Students are introduced to RIT's Office of Career Services and Cooperative Education, and learn about professional and ethical responsibilities for their co-op and subsequent professional experiences. Completion of this seminar and the related assignments are required before a CS student can be registered for co-op. (Prerequisites: This class is restricted to COMPSCI-BS or COMPEX-UND Major students with at least 2nd year standing.) **Lecture 1, Credits 0 (Fall, Spring)**

CSCI-101

Principles of Computing

This course is designed to introduce students to the central ideas of computing. Students will engage in activities that show how computing changes the world and impacts daily lives. Students will develop step-by-step written solutions to basic problems and implement their solutions using a programming language. Assignments will be completed both individually and in small teams. Students will be required to demonstrate oral and written communication skills through such assignments as short papers, homeworks, group discussions and debates, and development of a term paper. **Lecture 3, Credits 3 (Fall)**

CSCI-140

Computer Science for AP Students

This accelerated course covers material from the first-year sequence of courses and provides the foundation for all subsequent Computer Science courses. The course stresses problem solving while covering modern software development techniques and introducing essential software tools. Topics include tree and graph structures, nested data structures, objects, classes, inheritance, interfaces, object-oriented collection class libraries for abstract data types (e.g. stacks, queues, maps, and trees), and static vs. dynamic data types. Concepts of object-oriented design are a large part of the course. Software qualities related to object orientation, namely cohesion, minimal coupling, modifiability, and extensibility, are all introduced in this course, as well as a few elementary object-oriented design patterns. Input and output streams, graphical user interfaces, and exception handling are covered. Note: Requires department permission for registration. **Lec/Lab 6, Credits 4 (Fall)**

CSCI-141

Computer Science I

This course serves as an introduction to computational thinking using a problem-centered approach. Specific topics covered include: expression of algorithms in pseudo code and a programming language; functional and imperative programming techniques; control structures; problem solving using recursion; basic searching and sorting; elementary data structures such as lists, trees, and graphs; and correctness, testing and debugging. Assignments (both in class and for homework) requiring a pseudo code solution and an implementation are an integral part of the course. An end-of-term project is also required. **Lec/Lab 6, Credits 4 (Fall, Spring)**

CSCI-142

Computer Science II

This course delves further into problem solving by continuing the discussion of data structure use and design, but now from an object-oriented perspective. Key topics include more information on tree and graph structures, nested data structures, objects, classes, inheritance, interfaces, object-oriented collection class libraries for abstract data types (e.g. stacks, queues, maps, and trees), and static vs. dynamic data types. Concepts of object-oriented design are a large part of the course. Software qualities related to object orientation, namely cohesion, minimal coupling, modifiability, and extensibility, are all introduced in this course, as well as a few elementary object-oriented design patterns. Input and output streams, graphical user interfaces, and exception handling are covered. Students will also be introduced to a modern integrated software development environment (IDE). Programming projects will be required. (Prerequisites: CSCI-141 with a grade of C- or better or equivalent course.) **Lec/Lab 6, Credits 4 (Fall, Spring, Summer)**

CSCI-242

Computer Science for Transfer Students

This course serves as a means of bringing transfer students with some programming and data structures background to the same skill level that the computer science program's first year students have after completing CSCI 141 and 142. Problem solving skills and the choice and application of appropriate algorithms and data structures are at the core of the course. Assignments (both in class and for homework) requiring a design and an implementation are an integral part of the course. Larger programming projects are also required. **Lec/Lab 6, Credits 4 (Fall, Spring)**

CSCI-243 **The Mechanics of Programming**
Students will be introduced to the details of program structure and the mechanics of execution as well as supportive operating system features. Security and performance issues in program design will be discussed. The program translation process will be examined. Programming assignments will be required. (Prerequisite: C- or better in CSCI-140 or CSCI-142 or CSCI-242 or SWEN-124 or CSEC-124 or GCIS-124 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

CSCI-250 **Concepts of Computer Systems**
An introduction to the hardware and software organization of computer systems. The course emphasizes a multilevel model of computer organization. Topics include the digital logic level; the micro architecture level; the machine instruction set level; the operating system level; and the assembly language level. Programming assignments will be required. (Prerequisites: (CSCI-243 or 4003-334) and (MATH-190 or MATH-200 or 1016-366) or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

CSCI-251 **Concepts of Parallel and Distributed Systems**
This course is an introduction to the organization and programming of systems comprising multiple computers. Topics include the organization of multi-core computers, parallel computer clusters, computing grids, client-server systems, and peer-to-peer systems; computer networks and network protocols; network security; multi-threaded programming; and network programming. Programming projects will be required. (Prerequisites: CSCI-243 or SWEN-262 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

CSCI-261 **Analysis of Algorithms**
This course provides an introduction to the design and analysis of algorithms. It covers a variety of classical algorithms and data structures and their complexity and will equip students with the intellectual tools to design, analyze, implement, and evaluate their own algorithms. (Prerequisites: (CSCI-243 or SWEN-262) and (MATH-190 or MATH-200) or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

CSCI-262 **Introduction to Computer Science Theory**
This course provides an introduction to the theory of computation, including formal languages, grammars, auto-mata theory, computability, and complexity. (Prerequisites: (MATH-190 or MATH-200) and (CSCI-140 or CSCI-141 or CSCI-242 or SWEN-123 or SWEN-124 or CSECI-123 or CSEC-124 or GCIS-123 or GCIS-124) or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

CSCI-263 **Honors Introduction to Computer Science Theory**
This course provides a challenging introduction to the theory of computation with an emphasis on problem solving. Topics include formal languages, grammars, auto-mata theory, computability, and complexity. (Prerequisites: (MATH-190 or MATH-200) and (CSCI-140 or CSCI-141 or CSCI-242 or SWEN-123 or SWEN-124 or CSECI-123 or CSEC-124 or GCIS-123 or GCIS-124) or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

CSCI-264 **Honors Analysis of Algorithms**
This course provides a challenging introduction to the design and analysis of algorithms with an emphasis on problem solving and algorithmic research. It covers a variety of classical algorithms and data structures and their complexity, as well as deeper coverage of more advanced material; for example, linear programming, approximation algorithms, and randomized algorithms. The course will equip students with the intellectual tools to design, analyze, implement, and evaluate their own algorithms. (Prerequisites: (CSCI-243 or SWEN-262) and (MATH-190 or MATH-200) or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

CSCI-320 **Principles of Data Management**
This course provides a broad introduction to the principles and practice of modern data management, with an emphasis on the relational database model. Topics in relational database systems include data modeling; the relational model; relational algebra; Structured Query Language (SQL); and data quality, transactions, integrity and security. Students will also learn approaches to building relational database application programs. Additional topics include object-oriented and object-relational databases; semi-structured databases (such as XML); and information retrieval. A database project is required. (Prerequisites: (MATH-190 or MATH-200) and (CSCI-140 or CSCI-142 or CSCI-242 or SWEN-124 or CSEC-124 or GCIS-124) or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

CSCI-331 **Introduction to Artificial Intelligence**
An introduction to the theories and algorithms used to create artificial intelligence (AI) systems. Topics include search algorithms, logic, planning, machine learning, and applications from areas such as computer vision, robotics, and natural language processing. Programming assignments are an integral part of the course. (Prerequisites: (CSCI-243 or SWEN-262) and (MATH-251 or STAT-205) or equivalent courses. Students cannot take and receive credit for this course if they have taken CSCI-630.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

CSCI-335 **Machine Learning**
An introduction to both foundational and modern machine learning theories and algorithms, and their application in classification and regression. Topics include: Mathematical background of machine learning (e.g. statistical analysis and visualization of data), Bayesian decision theory, parametric and non-parametric classification models (e.g., SVMs and Nearest Neighbor models) and neural network models (e.g. Convolutional, Recurrent, and Deep Neural Networks). Programming assignments are required. (Prerequisites: (CSCI-243 or SWEN-262) and (MATH-251 or STAT-205) or equivalent courses. Students may not take and receive credit for CSCI-335 and CSCI-635.) **Lecture 3, Credits 3 (Fall, Spring)**

CSCI-344 **Programming Language Concepts**
This course is a study of the syntax and semantics of a diverse set of high-level programming languages. The languages chosen are compared and contrasted in order to demonstrate general principles of programming language design and implementation. The course emphasizes the concepts underpinning modern languages rather than the mastery of particular language details. Programming projects will be required. (Prerequisites: CSCI-243 or SWEN-250 or IGME-309 or 4003-334 or 4010-361 or 4080-487) and (MATH-190 or MATH-200) or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

CSCI-351 **Data Communications and Networks**
This course is an in-depth study of data communications and networks. The course covers design of, and algorithms and protocols used in, the physical, data link, network, transport, and application layers in the Internet; methods for modeling and analyzing networks, including graphs, graph algorithms, and discrete event simulation; and an introduction to network science. Programming projects will be required. (Prerequisites: CSCI-251 and (MATH-251 or STAT-251 or STAT-205) or equivalent courses. Students cannot take and receive credit for this course if they have taken CSCI-651.) **Lecture 3, Credits 3 (Fall)**

CSCI-352 **Operating Systems**
An in-depth study of operating system concepts. Topics include process synchronization, interprocess communication, deadlock, multiprogramming and multiprocessing, processor scheduling and resource management, memory management, static and dynamic relocation, virtual memory, file systems, logical and physical I/O, device allocation, I/O processor scheduling, process and resource protection. Programming projects involving the development of or modification to operating system kernel features will be required. (Prerequisites: CSCI-250 or CMPE-240 or SWEN-340 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

CSCI-420 **Principles of Data Mining**
This course provides an introduction to the major concepts and techniques used in data mining of large databases. Topics include the knowledge discovery process; data exploration and cleaning; data mining algorithms; and ethical issues underlying data preparation and mining. Data mining projects, presentations, and a term paper are required. (Prerequisites: CSCI-320 and (STAT-145 or MATH-251 or STAT-251 or STAT-205) or equivalent courses. Students may not take this course if they have received credit for CSCI-620.) **Lecture 3, Credits 3 (Fall, Spring)**

CSCI-421 **Principles of Database System Implementation**
This course provides a broad introduction to database management systems including data modeling, the relational model, and SQL. Database system implementation issues are covered next, where the focus is on data structures and algorithms used to implement database management systems. Topics include physical data organization, indexing and hashing, query processing and optimization, database recovery techniques, transaction management, concurrency control, and database performance evaluation. A programming project will be required. (Prerequisites: CSCI-320. Students may not take and receive credit for CSCI-421 and CSCI-621. If you have earned credit for CSCI-621 or you are currently enrolled in CSCI-621 you will not be permitted to enroll in CSCI-421.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

CSCI-431 **Introduction to Computer Vision**
An introduction to the underlying concepts of computer vision. The course will consider fundamental topics, including image formation, edge detection, texture analysis, color, segmentation, shape analysis, detection of objects in images and high level image representation. Depending on the interest of the class, more advanced topics will be covered, such as image database retrieval or robotic vision. Programming homework assignments that implement the concepts discussed in class are an integral part of the course. (Prerequisites: (CSCI-243 or SWEN-262) and (CSCI-262 or CSCI-263) or equivalent courses. Students cannot take and receive credit for this course if they have taken CSCI-631.) **Lecture 3, Credits 3 (Fall, Spring)**

CSCI-452 **Systems Programming**
Application of operating system concepts to the design of hardware interfaces for a multiprogramming environment. Laboratory work includes the development of a multiprogramming (optionally, multiprocessing) kernel with system call and interrupt handling facilities, and the building of device drivers for a variety of peripheral devices. This course provides extensive experience with those aspects of systems programming that deal directly with the hardware interface. A significant team programming project is a major component of this course. (Prerequisites: CSCI-352 or (4003-334 and 4003-345) or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

CSCI-453**Computer Architecture**

Computer Architecture is a study of the design of both modern and classic computer hardware. Topics include: a review of classical computer architectures; the design of operation codes and addressing modes, data formats, and their implementation; internal and external bus structures; architectural features to support virtual storage and page-replacement policies, high-level language features, and operating systems. Students will write programs which simulate the organization of several different processor architectures to help further their understanding of design choices. (Prerequisites: CSCI-352 or 4003-440 or equivalent courses.)

Lecture 3, Credits 3 (Spring)

CSCI-455**Principles of Cybersecurity**

This course provides a broad introduction to cybersecurity principles and practices, and emphasizes policies and mechanisms for building secure and trusted computer systems. It will cover cybersecurity principles, policies and mechanisms; core knowledge areas of data, software, component, connection, system, human, organizational and societal security; and crosscutting concepts of confidentiality, integrity, availability, risk, adversarial thinking, and systems thinking. Topics in privacy, and legal and ethical aspects will also be emphasized. Presentations, reports and projects are required. This course requires the knowledge of computer science theory and concepts of computer systems. (Prerequisites: CSCI-250 and (CSCI-262 or CSCI-263) or equivalent courses.)

Lecture 3, Credits 3 (Spring)

CSCI-462**Introduction to Cryptography**

This course provides an introduction to cryptography, its mathematical foundations, and its relation to security. It covers classical cryptosystems, private-key cryptosystems (including DES and AES), hashing and public-key cryptosystems (including RSA). The course also provides an introduction to data integrity and authentication. (Prerequisites: (CSCI-243 or SWEN-262 or CSEC-202) and (MATH-190 or MATH-200) or equivalent courses.)

Lecture 3, Credits 3 (Fall, Spring, Summer)

CSCI-464**Xtreme Theory**

A fast paced, informal look at current trends in the theory of computing. Each week is dedicated to a different topic and will explore some of the underlying theory as well as the practical applications of the theory. Sample topics may include: quantum cryptography, networks and complex systems, social welfare and game theory, zero knowledge protocols. Students will be evaluated on homework assignments and a final presentation. Offered every other year. (Prerequisites: (MATH-190 or MATH-200) and (CSCI-140 or CSCI-142 or CSCI-242 or SWEN-124 or CSEC-124 or GCIS-124) or equivalent courses.)

Lecture 3, Credits 3 (Fall)

CSCI-471**Professional Communications**

This course focuses on developing and improving verbal and written communication skills specific to the discipline of computer science. Topics include the different forms of writing in computer science (books, theses, journal articles, technical reports, manuscripts, etc.), writing styles of computer scientists, document readability and usability, documents for career readiness, effective presentations, teamwork and peer review, research methods, experimentation, documenting mathematics and algorithms, proper formatting of graphs, figures, and tables, and ethical, social, and professional issues facing Computer Scientists. This course is approved as Writing Intensive. (This class is restricted to students with at least 4th year standing COMPSCI-BS or COMPSCI-2M)

Lecture 3, Credits 3 (Fall, Spring, Summer)

CSCI-472**Historical and Ethical Perspectives in Computer Science**

Students who have a background in Computer Science theories, algorithms, and data structures will be provided a look at the history of Computer Science from science and ethical perspectives. Topics include an early history of Computer Science, a study of the people who shaped Computer Science, and a discussion of major milestones in Computer Science. Additionally, students will study ethical issues in Computer Science and how past issues affect modern designs and decision making as well as the ethical decisions that need to be made by computer scientists. Students will be required to work in teams on several assignments. Papers, presentations, and oral presentations are required. Note: With department permission, this course may be used as an alternative to CSCI-471 towards the Computer Science BS degree. (Prerequisites: This class is restricted to students with at least 4th year standing.)

Lecture 3, Credits 3 (Fa/sp/su)

CSCI-488**CS Undergraduate Summer Co-op**

Students perform professional work related to Computer Science for which they are paid. Students must complete a student co-op work report for each term for which they are registered; students are also evaluated each term by their employer. A satisfactory grade is given for co-op when both a completed student co-op work report and a completed, corresponding employer evaluation are received and when both documents are generally consistent. When registered for co-op, students are considered by RIT to have full-time status. In order to register for co-op for summer term, we expect that students will work a minimum of 10 weeks and work a minimum of 35 hours per week.

CO OP, Credits 0 (Summer)

CSCI-499**Computer Science Undergraduate Co-op**

Students perform professional work related to Computer Science for which they are paid. Students work full time during the term for which they are registered. Students must complete a student co-op work report for each term for which they are registered; students are also evaluated each term by their employer. A satisfactory grade is given for co-op when both a completed student co-op work report and a completed, corresponding employer evaluation are received and when both documents are generally consistent. (Enrollment in this course requires permission from the department offering the course.)

CO OP, Credits 0 (Fall, Spring)

CSCI-509**Seminar in Computer Science**

This course examines current topics in Computer Science. This is intended to allow faculty to pilot potential new undergraduate offerings. Specific course details (such as prerequisites, course topics, format, learning outcomes, assessment methods, and resource needs) will be determined by the faculty member(s) who propose a specific seminar course in this area. Specific course instances will be identified as belonging to no cluster; hence, such courses will count only as general Computer Science electives.

Lec/Lab 3, Credits 3

CSCI-510**Introduction to Computer Graphics**

Introduction to Computer Graphics is a study of the hardware and software principles of interactive raster graphics. Topics include an introduction to the basic concepts, 2-D and 3-D modeling and transformations, viewing transformations, projections, rendering techniques, graphical software packages and graphics systems. The course will focus on rasterization techniques and emphasize the hardware rasterization pipeline including the use of hardware shaders. Students will use a standard computer graphics API to reinforce concepts and study fundamental computer graphics algorithms. Programming projects will be required. (Prerequisites: MATH-241 and (CSCI-243 or SWEN-262) or equivalent courses. Students cannot take and receive credit for this course if they have taken CSCI-610.)

Lecture 3, Credits 3 (Fall, Spring)

CSCI-518**Collaborative Seminar in Computer Graphics**

This course examines current topics in Computer Graphics. This is intended to allow faculty to pilot potential new undergraduate offerings. Specific course details (such as prerequisites, course seminar, format, learning outcomes, assessment methods, and resource needs) will be determined by the faculty member(s) who propose a specific seminar course in this area. Specific course instances will be identified as belonging to the Computer Graphics and Visualization cluster. (Enrollment in this course requires permission from the department offering the course.)

Lab 3, Credits 3

CSCI-518**Collaborative Seminar in Computer Graphics**

This course examines current topics in Computer Graphics. This is intended to allow faculty to pilot potential new undergraduate offerings. Specific course details (such as prerequisites, course seminar, format, learning outcomes, assessment methods, and resource needs) will be determined by the faculty member(s) who propose a specific seminar course in this area. Specific course instances will be identified as belonging to the Computer Graphics and Visualization cluster. (Enrollment in this course requires permission from the department offering the course.)

Lecture 2, Credits 3

CSCI-519**Seminar in Computer Graphics**

This course examines current topics in Computer Graphics. This is intended to allow faculty to pilot potential new undergraduate offerings. Specific course details (such as prerequisites, course seminar, format, learning outcomes, assessment methods, and resource needs) will be determined by the faculty member(s) who propose a specific seminar course in this area. Specific course instances will be identified as belonging to the Computer Graphics and Visualization cluster.

Lecture 3, Credits 3

CSCI-521**Principles of Data Cleaning and Preparation**

This course provides an introduction to the concepts and techniques used in preparing data for subsequent data mining. Topics include the knowledge discovery process; data exploration and its role; data extraction, cleaning, integration and transformation; handling numeric, unstructured, text, web, and other forms of data; and ethical issues underlying data preparation and mining. Data cleaning projects and a paper are required. (Prerequisites: CSCI-320. Students may not take and receive credit for CSCI-521 and CSCI-721. If you have earned credit for CSCI-721 or you are currently enrolled in CSCI-721 you will not be permitted to enroll in CSCI-521.)

Lecture 3, Credits 3 (Fall, Spring, Summer)

CSCI-529**Seminar in Data Management**

This course examines current topics in Data Management. This is intended to allow faculty to pilot potential new undergraduate offerings. Specific course details (such as prerequisites, course seminar, format, learning outcomes, assessment methods, and resource needs) will be determined by the faculty member(s) who propose a specific seminar course in this area. Specific course instances will be identified as belonging to the Data Management cluster, the Security cluster, or both clusters.

Lecture 3, Credits 3

CSCI-531 Introduction to Security Measurement
The course will introduce students into the algorithmic foundations and modern methods used for security evaluation and tools design. It will combine a theoretical revision of the methods and models currently applied for computer security evaluation and an investigation of computer security through the study of user's practice. The students will be required to complete a few homework assignments, to deliver a class presentation and to implement a team project. (Prerequisites: CSCI-351 or (4003-420 and 4003-440) or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

CSCI-532 Introduction to Intelligent Security Systems
The course will introduce students to the application of intelligent methodologies in computer security and information assurance systems design. It will review different application areas such as intrusion detection and monitoring systems, access control and biological authentication, firewall structure and design. The students will be required to implement a course project on design of a particular security tool with an application of an artificial intelligence methodology and to undertake its performance analysis. (Prerequisites: CSCI-331 or CSCI-351 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

CSCI-536 Information Retrieval
An introduction to the theories and techniques used to construct search engines. Topics include search interfaces, traditional retrieval models (e.g., TF-IDF, BM25), modern retrieval techniques (e.g., neural reranking and retrieval), search engine evaluation, and search applications (e.g., conversational IR, enterprise search). Students will also review current IR research topics, and complete a group project in which they will design and execute experiments for search engine components. (Prerequisites: CSCI-331 or equivalent course. Students may not take and receive credit for CSCI-536 and CSCI-636.) **Lecture 3, Credits 3 (Spring)**

CSCI-539 Seminar in Artificial Intelligence
This course examines current topics in Artificial Intelligence. This is intended to allow faculty to pilot potential new undergraduate offerings. Specific course details (such as prerequisites, course seminar, format, learning outcomes, assessment methods, and resource needs) will be determined by the faculty member(s) who propose a specific seminar course in this area. Specific course instances will be identified as belonging to the Artificial Intelligence cluster, the Computer Graphics and Visualization cluster, the Security cluster, or some combination of these three clusters. **Lecture 3, Credits 3**

CSCI-541 Programming Skills
The goal of this course is to introduce the students to a programming paradigm and an appropriate programming language chosen from those that are currently important or that show high promise of becoming important. A significant portion of the learning curve occurs through programming assignments with exemplary solutions discussed later in class. The instructor will post specifics prior to registration. With the approval of the program coordinator, the course can be taken for credit more than once, provided each instance deals with a different paradigm and language. (Prerequisites: CSCI-344 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

CSCI-549 Seminar in Languages and Tools
This course examines current topics in Languages and Tools. This is intended to allow faculty to pilot potential new undergraduate offerings. Specific course details (such as prerequisites, course seminar, format, learning outcomes, assessment methods, and resource needs) will be determined by the faculty member(s) who propose a specific seminar course in this area. Specific course instances will be identified as belonging to the Languages and Tools cluster, the Security cluster, or both clusters. **Lecture 3, Credits 3**

CSCI-559 Seminar in Systems
This course examines current topics in Systems. This is intended to allow faculty to pilot potential new undergraduate offerings. Specific course details (such as prerequisites, course seminar, format, learning outcomes, assessment methods, and resource needs) will be determined by the faculty member(s) who propose a specific seminar course in this area. Specific course instances will be identified as belonging to the Distributed Systems cluster, the Architecture and Operating Systems cluster, the Security cluster, or some combination of these three clusters. **Lecture 3, Credits 3**

CSCI-569 Seminar in Theory
This course examines current topics in Theory. This is intended to allow faculty to pilot potential new undergraduate offerings. Specific course details (such as prerequisites, course seminar, format, learning outcomes, assessment methods, and resource needs) will be determined by the faculty member(s) who propose a specific seminar course in this area. Specific course instances will be identified as belonging to the Theory cluster, the Security cluster, or both clusters. **Lecture 3, Credits 3**

CSCI-571 Honors Capstone Research
This course allows students to pursue two threads of research in computer science. One thread is the discovery and analysis of previous work in the field. Students will select, read and collectively discuss papers from conferences and journals in CS. A survey paper on a topic of the student's choice will be required. The other thread is an independent project. Students will select a topic, lay out weekly goals, and meet with the instructor weekly. A final report and presentation will be required. (Enrollment in this course requires permission from the department offering the course.) **Lecture 3, Credits 3 (Fall, Spring)**

CSCI-589 Undergraduate Thesis Proposal and Preparation
Students work with a supervising faculty member to complete their undergraduate thesis proposal, and do additional background preparation (e.g., programming, study, exercises, and analysis) for the subject area and specific problem(s) to be addressed in a thesis. At the end of the semester, a thesis proposal must be submitted for approval to the advisor. Additional deliverables set by the advisor are also required (e.g., source code, bibliographies, notes, presentations, etc.). **Ind Study 1, Credits 3 (Fall)**

CSCI-590 Undergraduate Thesis
Thesis capstone of the Bachelor's Degree Program. The thesis document identifies a central hypothesis or key problem(s), provides a critical review of related work, and reports methods, results, and conclusions from the associated research. (Prerequisite: CSCI-589 or equivalent course.) **Ind Study 1, Credits 3 (Fall, Spring, Summer)**

CSCI-599 Computer Science Undergraduate Independent Study
Students work with a supervising faculty member on topics of mutual interest. A student works with a potential faculty sponsor to draft a proposal that describes what a student plans to do, what deliverables are expected, how the student's work will be evaluated, and how much credit will be assigned for successful completion of the work. The faculty sponsor proposes the grade, but before the grade is officially recorded, the student must submit a final report that summarizes what was actually accomplished. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 3 (Fall, Spring, Summer)**

Computer Security

CSEC-088 CyberCorps Scholarship for Service Seminar
This zero credit course is restricted to CyberCorps Scholarship for Service (SFS) recipients only. It provides a platform for mentoring next generation cybersecurity experts. Current topics on cybersecurity will be discussed. Led by the faculty supervisors, the weekly meetings are also designed for presentations on topics related to cybersecurity and the program. (Enrollment in this course requires permission from the department offering the course.) **Lecture 1, Credits 0 (Fall, Spring)**

CSEC-095 Visiting Research Experience
This supervised graduate research experience involves visiting international student(s) in an original research project. Under the guidance of GCCIS faculty, students will collect data and contribute to problem solving. As a first research experience, emphasis is on the process of scientific research, including problem definition, formulating a research plan, data collection/analysis and interpretation based on existing research. (This course requires permission of the Instructor to enroll.) **Research 1, Credits 0 (Fall, Spring, Summer)**

CSEC-099 Cooperative Education Seminar
This course helps students prepare for co-operative education employment ("co-op") by developing job search strategies and material. Students will explore current and emerging aspects of the Computing Security field with employers, alumni and current students who have already been on co-op. Students are introduced to RIT's Office of Career Services and Cooperative Education and learn about professional and ethical responsibilities for their co-op and subsequent professional experiences. Students will work collaboratively to build résumés and to prepare for interviews. (Prerequisites: This class is restricted to students with at least 2nd year standing.) **Lecture 1, Credits 0 (Fall, Spring)**

CSEC-101 Fundamentals of Computing Security
An introduction to the fundamental issues, concepts and tools common to all areas of computing security. Topics include identifying attackers and their motivations. Essential techniques will be introduced covering the areas of anti-virus, monitoring, virtual machines, account control, and access rights management. Various security models will be investigated. Concept areas such as confidentiality, integrity, availability and privacy will be studied. **Lecture 3, Credits 3 (Fall, Spring)**

CSEC-102**Information Assurance and Security**

Computer-based information processing is a foundation of contemporary society. As such, the protection of digital information, and the protection of systems that process this information has become a strategic priority for both the public and private sectors. This course provides an overview of information assurance and security concepts, practices, and trends. Topics include computing and networking infrastructures, risk, threats and vulnerabilities, legal and industry requirements for protecting information, access control models, encryption, critical national infrastructure, industrial espionage, enterprise backup, recovery, and business continuity, personal system security, and current trends and futures. **Lecture 3, Credits 3 (Fall, Spring)**

CSEC-123**Software Development and Problem Solving I**

A first course introducing students to the fundamentals of computational problem solving. Students will learn a systematic approach to problem solving, including how to frame a problem in computational terms, how to decompose larger problems into smaller components, how to implement innovative software solutions using a contemporary programming language, how to critically debug their solutions, and how to assess the adequacy of the software solution. Additional topics include an introduction to object-oriented programming and data structures such as arrays and stacks. Students will complete both in-class and out-of-class assignments. **Lab 6, Credits 4 (Fall, Spring)**

CSEC-124**Software Development and Problem Solving II**

A second course that delves further into computational problem solving, now with a focus on an object-oriented perspective. There is a continued emphasis on basic software design, testing & verification, and incremental development. Key topics include theoretical abstractions such as classes, objects, encapsulation, inheritance, interfaces, polymorphism, software design comprising multiple classes with UML, data structures (e.g. lists, trees, sets, maps, and graphs), exception/error handling, I/O including files and networking, concurrency, and graphical user interfaces. Additional topics include basic software design principles (coupling, cohesion, information expert, open-closed principle, etc.), test driven development, design patterns, data integrity, and data security. (Prerequisite: C- or better in SWEN-123 or CSEC-123 or GCIS-123 or equivalent course.) **Lab 6, Credits 4 (Fall, Spring, Summer)**

CSEC-140**Introduction to Cybersecurity**

This course will introduce many fundamental cybersecurity concepts. The course will teach students to think about information systems using an adversarial mindset, evaluate risk to information systems, and introduce controls that can be implemented to reduce risk. Topics will include authentication systems, data security and encryption, risk management and security regulatory frameworks, networking and system security, application security, organizational and human security considerations, and societal implications of cybersecurity issues. These topics will be discussed at an introductory level with a focus on applied learning through hands-on virtual lab exercises. **Lecture 3, Credits 3 (Fall, Spring)**

CSEC-201**Programming for Information Security**

This course builds upon basic programming skills to give students the programming knowledge necessary to study computing security. Students will be introduced to network programming, memory management, and operating system calls along with associated security concepts. Specific focus will be placed on understanding the compilation process and on the relation between high-level programming concepts and low-level programming concepts, culminating in identifying and exploiting memory corruption vulnerabilities. (Prerequisites: (CSEC-101 or CSEC-102 or CSEC-140) and (CSEC-124 or SWEN-124 or GCIS-124 or CSCI-142 or CSCI-140 or CSCI-242) or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

CSEC-202**Reverse Engineering Fundamentals**

This course will teach students the core concepts needed to analyze unknown source code. Students will study a variety of low-level programming languages and how high-level programming language structures relate to low-level programming languages. Students will learn study tools and techniques used for both static and dynamic analysis of unknown binaries, providing the foundation for further study in malware analysis. (Prerequisite: CSEC-201 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

CSEC-362**Cryptography and Authentication**

As more users access remote systems, the job of identifying and authenticating those users at distance becomes increasingly difficult. The growing impact of attackers on identification and authentication systems puts additional strain on our ability to ensure that only authorized users obtain access to controlled or critical resources. This course introduces encryption techniques and their application to contemporary authentication methods. (Prerequisites: (CSEC-101 or CSEC-102 or CSEC-140) and (MATH-131 or MATH-190) or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

CSEC-363**Cyber Security Policy and Law**

In this course, students will study the need for information security policies, procedures and standards. Students will write security policies and examine cases used as precedent for current laws. Other topics may include, but are not limited to, trust models, security policy design, incident response, and review of legal cases. (Prerequisites: (CSEC-101 or 4050-220) and CSEC-499 or equivalent courses and minimum 3rd year standing.) **Lecture 3, Credits 3 (Fall, Spring)**

CSEC-380**Principles of Web Application Security**

This course is designed to give students a foundation in the theories and practice relating to web application security. The course will introduce students to the concepts associated with deploying and securing a typical HTTP environment as well as defensive techniques they may employ. (Prerequisites: (CSEC-101 or CSEC-102 or CSEC-140) and NSSA-245 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

CSEC-461**Computer System Security**

This course will discuss the areas of liability, exposure, opportunity, ability and function of various weaknesses in computer security. The course will cover forms of attack and the methods to detect and defend against them. The issues and facilities available to both the intruder and administrator will be examined and evaluated with appropriate out-of-class laboratory exercises to illustrate their effect. (Prerequisites: (CSEC-101 or CSEC-102 or CSEC-140) and NSSA-221 and NSSA-245 or equivalent courses.) **Lab 2, Credits 3 (Spring)**

CSEC-461**Computer System Security**

This course will discuss the areas of liability, exposure, opportunity, ability and function of various weaknesses in computer security. The course will cover forms of attack and the methods to detect and defend against them. The issues and facilities available to both the intruder and administrator will be examined and evaluated with appropriate out-of-class laboratory exercises to illustrate their effect. (Prerequisites: (CSEC-101 or CSEC-102 or CSEC-140) and NSSA-221 and NSSA-245 or equivalent courses.) **Lecture 2, Credits 3 (Spring)**

CSEC-462**Network Security and Forensics**

This course investigates the many facets of network security and forensics. Students will examine the areas of intrusion detection, evidence collection, network auditing, network security policy design and implementation as well as preparation for and defense against attacks. The issues and facilities available to both the intruder and data network administrator will be examined and evaluated with appropriate laboratory exercises to illustrate their effect. (Prerequisites: (CSEC-101 or CSEC-102 or CSEC-140) and NSSA-245 or equivalent courses.) **Lab 4, Credits 3 (Spring)**

CSEC-462**Network Security and Forensics**

This course investigates the many facets of network security and forensics. Students will examine the areas of intrusion detection, evidence collection, network auditing, network security policy design and implementation as well as preparation for and defense against attacks. The issues and facilities available to both the intruder and data network administrator will be examined and evaluated with appropriate laboratory exercises to illustrate their effect. (Prerequisites: (CSEC-101 or CSEC-102 or CSEC-140) and NSSA-245 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

CSEC-463**Sensor Network Security**

This course will provide students with an introduction to sensor networks and the security concepts related to sensor networks. The unique networking and security challenges will be presented. Students will work on a related research problem identified in consultation with the instructor. The instructor will work with the students closely and guide them in the implementation and testing of the research ideas. (Prerequisites: (CSEC-101 or CSEC-102 or CSEC-140) and CSEC-201 or equivalent courses.) **Lec/Lab 3, Credits 3 (Fall)**

CSEC-464**Computer System Forensics**

This course focuses on the fundamental incident response and computer forensics procedures for computer systems. Students will follow the forensics procedures and use forensically-sound tools to uncover the activities of computer users (deleted and hidden files, cryptographic steganography, illegal software, etc.). Students will also technologies to gather and preserve this evidence to ensure admissibility in court. (Prerequisites: (CSEC-101 or CSEC-102 or CSEC-140) and NSSA-221 or equivalent courses.) **Studio 3, Credits 3 (Fall, Spring)**

CSEC-465**Network and System Security Audit**

This course will provide students with an introduction to the processes and procedures for performing a technical security audit of systems and networks. Students will explore state-of-the-art auditing techniques and apply appropriate tools to audit systems and network infrastructure components. In addition, students will write and present their audit reports on vulnerabilities as well as recommendations to fix any problems discovered. (Prerequisites: NSSA-221 and NSSA-245 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

CSEC-466**Introduction to Malware**

Computer malware is a computer program with malicious intent. In this course, students will study the history of computer malware, categorizations of malware such as computer viruses, worms, Trojan horses, spyware, etc. Other topics include, but are not limited to, basic structures and functions of malware, malware delivery mechanism, propagation models, anti-malware software, its methods and applications, reverse engineering techniques. (Prerequisites: (CSCI-462 or CSEC-362) and NSSA-221 and NSSA-245 or equivalent courses.) **Lec/Lab 3, Credits 3 (Fall)**

CSEC-467 Mobile Device Security and Forensics
This course will be an in-depth study of security, incident response, and forensics as applied to the hardening and protection of mobile devices. Students will learn issues specific to the security of and vulnerabilities of mobile devices as well as forensics tools and incident response techniques used to reveal activities and information related to mobile devices. (Prerequisites: (CSEC-101 or CSEC-102 or CSEC-140) and (CSEC-124 or SWEN-124 or GCIS-124 or CSCI-142 or CSCI-140 or CSCI-242) or equivalent courses.) **Lec/Lab 3, Credits 3 (Fall)**

CSEC-468 Risk Management for Information Security
The three key elements of risk management will be introduced and explored. These are risk analysis, risk assessment, and vulnerability assessment. Both quantitative and qualitative methodologies will be discussed as well as how security metrics can be modeled, monitored, and controlled. Several case studies will be used to demonstrate the risk management principles featured throughout the course. Students will work in teams to conduct risk assessments on the selected case study scenarios. They will develop mitigation plans and present the results of their analysis both in written reports and oral presentations. (Prerequisites: CSEC-101 or CSEC-102 or CSEC-140 or equivalent course and at least 3rd year standing.) **Lecture 3, Credits 3 (Fall)**

CSEC-470 Covert Communications
Covert communications have been employed in the past in traditional information warfare. Today with huge amounts of digital information exchanged in our cyber space and covert communication will become a potential tool for information warfare inside the space. Students will be introduced to the history, theory, methodology and implementation of various kinds of covert communications. Students will explore future techniques and uses of covert communications. More specifically students will explore possible uses of covert communications in the management of botnets. Students will conduct research in this topic area and will write a research paper on their research. Students will be required to submit their paper for publication in a peer-reviewed venue. (This course is restricted to INFOSEC-BS students with 4th year standing.) **Lecture 3, Credits 3 (Fall)**

CSEC-471 Penetration Testing Frameworks and Methodologies
The process and methodologies employed in negotiating a contract, performing a penetration test, and presenting the results will be examined and exercised. Students will be exposed to tools and techniques employed in penetration testing. Assignments will explore the difficulties and challenges in planning for and conducting an assessment exposing potential vulnerabilities. Students will develop a metric used to evaluate the security posture of a given network and will develop a coherent and comprehensive report of their findings to present to their client. Particular attention will be paid to the ramifications of the findings toward the security of the targets. (Prerequisites: This course is restricted to students in GCCIS with at least 3rd year student standing.) **Lec/Lab 3, Credits 3 (Spring)**

CSEC-472 Authentication and Security Models
Access control and authentication systems are some of the most critical components of cybersecurity ecosystems. This course covers the theory, design, and implementation of systems used in identification, authentication, authorization, and accountability processes with a focus on trust at each layer. Students will examine formal models of access control systems and approaches to system accreditation, the application of cryptography to authentication systems, and the implementation of IAAA principles in modern operating systems. A special focus will be placed on preparing students to research and write about future topics in this area. (Prerequisites: CSEC-362 or CSCI-462 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

CSEC-473 Cyber Defense Techniques
Students will study, build, defend and test the security of computer systems and networking infrastructure while potentially under attack. Students will gain an understanding of standard business operations, timelines and the value of risk and project management. Techniques as related to security guidelines and goals will be studied. Aspects of legal requirements, inheriting existing infrastructure, techniques for backup and recovery of data and systems will be examined. (Prerequisites: This course is restricted to students in GCCIS with at least 3rd year student standing.) **Lec/Lab 3, Credits 3 (Fall)**

CSEC-474 Unix-based System Forensics
This course is designed to provide students with the ability to identify and employ forensics techniques for gathering, preserving and analyzing evidence on Unix-based systems, and to report the pertinent evidence to the courts. The course emphasizes both the fundamental computer forensics procedures and the hands-on experience of utilizing forensics tools to uncover pertinent evidence from memory, allocated and unallocated space, and other Unix artifacts including log files, deleted files, browser history, emails, etc. Students will also follow and practice the forensically-sound procedures to ensure evidence admissibility in court. (Prerequisites: NSSA-221 or equivalent course.) **Lec/Lab 4, Credits 3 (Spring)**

CSEC-475 Windows System Forensics
This course is designed to provide students with the ability to identify and employ forensics techniques for gathering, preserving and analyzing evidence on Windows systems, and to report the pertinent evidence to the courts. The course emphasizes both the fundamental computer forensics procedures and the hands-on experience of utilizing the Windows forensics tools to uncover pertinent evidence from memory, allocated and unallocated space, and other Windows artifacts including registry, recycle bin, Internet Explorer, emails, etc. Students will also follow and practice the forensics-sound procedures to ensure evidence admissibility in court. (Prerequisites: NSSA-221 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall)**

CSEC-476 Malware Reverse Engineering
This course provides an overview of basic concepts, techniques, and tools of malware reverse engineering. Students will learn how to perform reverse engineering to discover hidden software functions and hidden network communication techniques and protocols. Students will also learn techniques to protect against software reverse engineering. (Prerequisites: (CSCI-462 or CSEC-362) and (CSEC-202 or CSEC-466) or equivalent courses.) **Lec/Lab 3, Credits 3 (Spring)**

CSEC-477 Disaster Recovery Planning and Business Continuity
Security and network professionals are increasingly being called upon to apply their knowledge to the development of disaster recovery and business continuity plans. This course will explore DRP/BC in depth using current tools and techniques. Business requirements will be analyzed from the budget, business needs and risk management perspective. Experience gained from at least one co-op is required. (Prerequisites: CSEC-101 or CSEC-102 or CSEC-140 or equivalent course and at least 3rd year standing.) **Lec/Lab 3, Credits 3 (Spring)**

CSEC-478 Advanced Mobile Device Forensics
This course will be an in-depth study of the forensics as applied to the hardening and protection of mobile devices. Students will learn the specifics of the advanced forensic techniques of smartphones and the third-party apps that proliferate these pervasive devices. Additionally, students will examine the various implementations of security in the various operating systems, devices and third-party apps. (Prerequisites: CSEC-467 or equivalent course.) **Lab 2, Credits 3 (Spring)**

CSEC-478 Advanced Mobile Device Forensics
This course will be an in-depth study of the forensics as applied to the hardening and protection of mobile devices. Students will learn the specifics of the advanced forensic techniques of smartphones and the third-party apps that proliferate these pervasive devices. Additionally, students will examine the various implementations of security in the various operating systems, devices and third-party apps. (Prerequisites: CSEC-467 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

CSEC-479 Advanced Mobile Device Security
This course will introduce students to the advanced concepts, techniques, and tools of mobile device security. Students will learn different security models, current malware, pen testing, reverse engineering of mobile devices. Students will perform mobile device security of the most popular operating systems in an effort to provide better security either within the device itself, or through its wireless connections. Students will also learn about mobile malware and the common practices of protection against mobile malware. (Prerequisites: CSEC-467 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall)**

CSEC-490 Capstone in Computing Security
This is a capstone course for students in the information security and forensics program. Students will apply knowledge and skills learned and work on real world projects in various areas of computing security. Projects may require performing security analysis of systems, networks, and software, etc., devising and implementing security solutions in real world applications. (This course is restricted to INFOSEC-BS students with 4th year standing.) **Lecture 3, Credits 3 (Fall, Spring)**

CSEC-498 Cooperative Education in Security Fundamentals
Students will gain experience and a better understanding of the field of cybersecurity by gaining practical experience in an area to which cybersecurity is commonly applied, such as software development, networking, or system administration. The goal of this co-op will be to gain a better understanding of the fundamental technologies used in the cybersecurity industry and experience in how professional teams in cybersecurity-adjacent fields operate. Students will be evaluated by their employer. If a transfer student, one term in residence must be completed at RIT carrying a full academic load. (Permission of the Department) (Prerequisite: CSEC-99 or equivalent course.) **CO OP, Credits 0 (Fa/sp/su)**

CSEC-499 Cooperative Education in CSEC
Students will gain experience and a better understanding of the application of technologies discussed in classes by working in the field of computing security. Students will be evaluated by their employer. If a transfer student, they must have completed one term in residence at RIT and be carrying a full academic load. (Enrollment in this course requires permission from the department offering the course.) **CO OP, Credits 0 (Fall, Spring, Summer)**

CSEC-520**Cyber Analytics and Machine Learning**

The course provides students an opportunity to explore methods and applications in cyber analytics with advanced machine learning algorithms including deep learning. Students will learn how to use machine learning methods to solve cybersecurity problems such as network security, anomaly detection, malware analysis, etc. Students will also learn basic concepts and algorithms in machine learning such as clustering, neural networks, adversarial machine learning, etc. Students taking this course should have the 4th year status and completed MATH-190 Discrete Math, MATH-251 Probability and Statistics I, and MATH-241 Linear Algebra. (Prerequisites: MATH-190 and MATH-241 and MATH-251 or equivalent courses and at least 4th year standing.) **Lecture 3, Credits 3 (Fall)**

CSEC-530**Trusted Computing and Trusted Execution**

This course introduces methods and technologies for establishing trust in modern computing systems, including classic approaches (e.g., boot chain-of-trust, secure boot, exception/privilege levels, and Trusted Platform Modules - TPMs) and more recent trusted execution architectures that enable the creation of hardware-isolated secure sub-domains (e.g., ARM TrustZone) and enclaved sub-process execution (e.g., Intel Secure Guard eXtensions - SGX). The course also includes a list of special topics within trusted computing discussing new developments in the field. (Prerequisites: CSCI-462 or CSEC-604 or equivalent course and 4th year standing.) **Lecture 3, Credits 3 (Fall)**

CSEC-559**UG Sem in Computing Security**

This course explores current topics in computing security. It is intended as a place holder course for faculty to experiment new course offerings in Computing Security undergraduate program. Course specific details change with respect to each specific focal area proposed by faculty. **Lec/Lab 3, Credits 0 - 3 (Fall, Spring)**

CSEC-569**Wireless Security**

The goal of this course is to provide the students with an understanding of the concepts and principles of wireless communications and networks along with their vulnerabilities and security protocols. In addition, the students will gain practical experience via a series of attack/defense lab activities, and a software-defined radio project to explore mechanisms for analyzing and/or securing modern wireless networks. The course begins with a primer on wireless security concepts from a physical-layer perspective. It then covers various generations of security protocols for IEEE 802.11 (Wi-Fi) systems, security of cellular networks, security of wireless protocols for Internet-of-Things (IoT), security of connected vehicles communications, and other selected trending topics. (Prerequisites: (CSCI-462 or CSEC-362) and NSSA-241 or equivalent courses.) **Lab 2, Credits 3 (Spring)**

CSEC-569**Wireless Security**

The goal of this course is to provide the students with an understanding of the concepts and principles of wireless communications and networks along with their vulnerabilities and security protocols. In addition, the students will gain practical experience via a series of attack/defense lab activities, and a software-defined radio project to explore mechanisms for analyzing and/or securing modern wireless networks. The course begins with a primer on wireless security concepts from a physical-layer perspective. It then covers various generations of security protocols for IEEE 802.11 (Wi-Fi) systems, security of cellular networks, security of wireless protocols for Internet-of-Things (IoT), security of connected vehicles communications, and other selected trending topics. (Prerequisites: (CSCI-462 or CSEC-362) and NSSA-241 or equivalent courses.) **Lecture 2, Credits 3 (Spring)**

CSEC-599**Independent Study in CSEC**

Students will work with a supervising faculty member on a project of mutual interest. Project design and evaluation will be determined through discussion with the supervising faculty member and documented through completion of an independent study form to be filed with the department of computing security. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 6 (Fall, Spring, Summer)**

Information Sciences and Technologies

ISTE-099**School of Information Second Year Seminar**

This course helps students prepare for cooperative employment by developing job search approaches and material. Students will explore current and emerging aspects of IST fields to help focus their skill development strategies. Students are introduced to the Office of Career Services and Cooperative Education, and learn about their professional and ethical responsibilities for their co-op and subsequent professional experiences. Students will work collaboratively to build résumés, cover letters, and prepare for interviewing. (Prerequisites: This class is restricted to HCC-BS or CMIT-BS or WMC-BS or COMPEX-UND Major students with at least 2nd year standing.) **Lecture 1, Credits 0 (Fall, Spring)**

ISTE-100**Computational Problem Solving in the Network Domain-I**

A first course in using the object-oriented approach in the network domain. Students will learn to design software solutions using the object-oriented approach, to implement software solutions using a contemporary programming language, and to test these software solutions. Topics include thinking in object-oriented terms, problem definition, designing solutions using the object-oriented approach, implementing solutions using a contemporary programming language, and testing software solutions. Programming projects will be required. **Lec/Lab 3, Credits 4 (Fall, Spring)**

ISTE-101**Computational Problem Solving in the Network Domain-II**

A second course in object-oriented problem solving in the network domain. Students will learn to develop software for the applications layer of the protocol stack. Topics include data structures, network processes, network protocols, and network security. Programming projects will be required. (Prerequisites: ISTE-100 or ISTE-202 or equivalent course.) **Lec/Lab 6, Credits 4 (Fall, Spring)**

ISTE-105**Web Foundations**

A hands-on introduction to Internet and web foundations for non-computing majors. Includes HTML (Hypertext Markup Language) and CSS (Cascading Stylesheets), web page design fundamentals, basic digital image manipulation, and web site implementation and maintenance. Students will design and build their own web sites using the latest technologies and deploy them to the web for world-wide access. (This class is restricted to non-computing majors. Students in GCCIS are not eligible to take this course.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

ISTE-110**FYW: Ethics in Computing**

Computing and the Internet are now integral parts of our lives. In this course, we consider and discuss how ethical theories and principles can inform and provide guidance about interactions and uses of computing technologies. Topics include the development interpretation, and application of ethical theory, moral values, personal responsibility, codes of conduct, ethics in the real and virtual worlds, intellectual property, and information security. This is a Writing Intensive (WI) course. Students are provided with guidance and opportunities for improving informal and formal writing skills. Grades received on writing assignments will constitute a significant component of the final course grade. **Lecture 3, Credits 3 (Fall, Spring)**

ISTE-120**Computational Problem Solving in the Information Domain I**

A first course in using the object-oriented approach to solve problems in the information domain. Students will learn to design software solutions using the object-oriented approach, to visually model systems using UML, to implement software solutions using a contemporary programming language, and to test these software solutions. Additional topics include thinking in object-oriented terms, and problem definition. Programming projects will be required. **Lec/Lab 6, Credits 4 (Fall, Spring)**

ISTE-121**Computational Problem Solving in the Information Domain II**

A second course in using the object-oriented approach to solving problems in the information domain. Students will learn: basic design principles and guidelines for developing graphical user interfaces, and use of the Event Model to implement graphical interfaces; algorithms for processing data structures; multithreading concepts and use of the Multithreading Model to design and implement advanced processing methods. Additional topics include the relational model of information organization, and the Client-Server model. Individual implementation projects are required. A team implementation exercise is used to provide students an opportunity to apply basic software development and project management practices in the context of a medium-scale project. (Prerequisites: ISTE-120 or NACA-161 or equivalent course.) **Lec/Lab 6, Credits 4 (Fall, Spring)**

ISTE-140**Web and Mobile I**

This course provides students with an introduction to internet and web technologies, and to development on Macintosh/UNIX computer platforms. Topics include HTML and CSS, CSS3 features, digital images, web page design and website publishing. Emphasis is placed on fundamentals, concepts and standards. Additional topics include the user experience, mobile design issues, and copyright/intellectual property considerations. Exercises and projects are required. **Lec/Lab 3, Credits 3 (Fall, Spring)**

ISTE-190**Foundations of Modern Information Processing**

Computer-based information processing is a foundation of contemporary society. As such, the protection of digital information, and the protection of systems that process this information has become a strategic priority for both the public and private sectors. This course provides an overview of information assurance and security concepts, practices, and trends. Topics include computing and networking infrastructures, risk, threats and vulnerabilities, legal and industry requirements for protecting information, access control models, encryption, critical national infrastructure, industrial espionage, enterprise backup, recovery, and business continuity, personal system security, and current trends and futures. **Lecture 3, Credits 3 (Fall, Spring)**

ISTE-200 **Java for Programmers**
An intensive review of object-oriented design and the Java programming language for students with prior programming background. This course covers the creation of application programs using Java. Topics include: Java and the Java environment, object-oriented design, GUI interfaces, exception handling, threads, and the client/server environment. Programming projects will be required. (Prerequisite: Object Oriented programming experience, such as an OO course, or work as an OO programmer). (Prerequisites: IGME-102 or IGME-106 or equivalent course.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

ISTE-202 **C++ for Programmers**
Introductory application programming with a network-centric nature will be explored. Topics covered include: C++ syntax, pointers, file handling, memory management, and object-oriented programming. Emphasis is on the development of problem-solving skills. Moderately sized programming assignments are required. Prior programming experience (two-course object-oriented) is required. Students should have a two-course object-oriented programming sequence or equivalent such as ISTE-120 and ISTE-121 to be successful in this course. **Lec/Lab 3, Credits 3 (Fall)**

ISTE-205 **Digital Image Creation**
This course explores the creation and manipulation of digital images intended for use on the web. Topics include basics of digital photography, acquisition of images, intermediate image manipulation, image compression, and intellectual property issues. (Prerequisites: ISTE-105 or ISTE-140 or equivalent course.) **Lec/Lab 3, Credits 3 (Spring)**

ISTE-206 **Digital Video Creation**
This course explores the creation of digital video intended for use on the web. Topics include basics of digital videography, acquisition of audio, editing, streaming, compression, as well as storytelling with video and integration into web sites and applications. (Prerequisites: ISTE-105 or ISTE-140 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall)**

ISTE-222 **Computational Problem Solving in the Information Technology Domain III**
The third course in the programming sequence expanding the student's knowledge base of higher level programming concepts including data structures, algorithm development and analysis, Big-O notation, directed graphs, priority queues, performance, and a greater understanding of how complex software can more easily be designed. Programming assignments are required. (Prerequisites: ISTE-121 or ISTE-200 or CSCI-142 or CSCI-140 or IGME-106 or CSCI-242 or GCIS-124 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

ISTE-230 **Introduction to Database and Data Modeling**
A presentation of the fundamental concepts and theories used in organizing and structuring data. Coverage includes the data modeling process, basic relational model, normalization theory, relational algebra, and mapping a data model into a database schema. Structured Query Language is used to illustrate the translation of a data model to physical data organization. Modeling and programming assignments will be required. Note: students should have one course in object-oriented programming. (Prerequisites: ISTE-120 or ISTE-200 or IGME-101 or IGME-105 or CSCI-140 or CSCI-142 or NACA-161 or NMAD-180 or BIOL-135 or GCIS-123 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

ISTE-240 **Web and Mobile II**
This course builds on the basics of web page development that are presented in Web and Mobile I and extends that knowledge to focus on theories, issues, and technologies related to the design and development of web sites. An overview of web design concepts, including usability, accessibility, information architecture, and graphic design in the context of the web will be covered. Introduction to web site technologies, including HTTP, web client and server programming, and dynamic page generation from a database also will be explored. Development exercises are required. (Prerequisites: (ISTE-120 or CSCI-140 or CSCI-141 or NACA-161 or IGME-105 or IGME-101 or NMAD-180 or GCIS-123) and (ISTE-140 or NACA-172 or IGME-230 or IGME-235) or equivalent course.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

ISTE-252 **Foundations of Mobile Design**
This course is an introduction to designing, prototyping, and creating applications and web applications for mobile devices. These devices include a unique set of hardware and communications capabilities, incorporate novel interfaces, are location aware, and provide persistent connectivity. Topics covered include user interaction patterns, connectivity, interface design, software design patterns, and application architectures. Programming projects are required. (Prerequisites: ISTE-240 or IGME-330 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

ISTE-260 **Designing the User Experience**
The user experience is an important design element in the development of interactive systems. This course presents the foundations of user-centered design principles within the context of human-computer interaction (HCI). Students will explore and practice HCI methods that span the development lifecycle from requirements analysis and creating the product/service vision through system prototyping and usability testing. Leading edge interface technologies are examined. Group-based exercises and design projects are required. (Prerequisite: ISTE-140 or IGME-230 or NACA-172 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

ISTE-262 **Foundations of Human Centered Computing**
This course explores how the fields of psychology, digital design, and computing converge in the design, development, and evaluation of new technologies that people find effective and enjoyable to use. Students will investigate the field of human-computer interaction (HCI), with a focus on how users' various sensory, motor, and cognitive abilities are essential to their successful use of technology. Students will be exposed to modern research methods and paradigms in field of human-computer interaction, including predictive modeling, heuristic evaluation, interpretive methods, and experimental user testing. Students will learn key design principles and guidelines and apply them to analyze existing designs and conduct a design process that is centered on human users of technology. (Prerequisite: ISTE-140 or IGME-230 or NACA-172 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

ISTE-264 **Prototyping and Usability Testing**
This course will explore how modern human centered computing design and evaluation methodologies can be effectively used to create high-quality and usable technologies for a variety of users. Students will learn how an initial design can be evaluated and improved through the use of prototyping and user evaluations. Students will investigate a variety of high- and low-fidelity prototyping techniques, plan an iterative design process for an application, conduct an evaluation of a prototype, and analyze the results of user testing to drive a design process. Programming is required. (Prerequisites: ISTE-262 or equivalent course.) **Lec/Lab 3, Credits 3 (Spring)**

ISTE-266 **Design for Accessibility**
This course will explore the design, evaluation, and use of computing and information technologies to benefit people with disabilities and older adults. Students will learn how to analyze the accessibility of existing software or websites, and they will learn how to design technology that can be effectively, enjoyably, and efficiently used by people with diverse sensory, motor, and cognitive abilities. Students will learn about cutting-edge ways in which science and technology has provided assistance and accessibility for people with disabilities. Students will learn how to investigate the needs of users with disabilities, design technologies according to universal design or accessibility principles, interpret key accessibility regulations and guidelines, and include people with disabilities in the design and evaluation of new technologies. Programming is required. (Prerequisites: ISTE-264 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

ISTE-270 **Data Exploration and Knowledge Discovery**
Rapidly expanding volumes of data from all areas of society are becoming available in digital form. High value information and knowledge is embedded in many of these data volumes. Unlocking this information can provide many benefits, and may also raise ethical questions in certain circumstances. This course provides students with a gentle, hands-on introduction to how interactive data exploration and data mining software can be used for data-driven knowledge discovery. Students will use statistical, visual, and data/text mining software systems to explore data collections from several different domains such as business, environmental management, healthcare, finance, and transportation. (Prerequisites: STAT-145 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

ISTE-271 **Introduction To Informatics**
This course introduces students to the world of Informatics and provides them with tools to begin working as an informatician. Students learn the breadth of informatics and the roles informaticians play. Tools for working with XML and spreadsheets are presented. The course utilizes extensive hands-on computing, but no programming experience is necessary. (This class is restricted to non-computing majors. Students in GCCIS are not eligible to take this course.) **Lec/Lab 2, Credits 2 (Fall)**

ISTE-305 **Rapid Online Presence**
Although large-scale web sites still require considerable development effort, there are today several options for establishing a web presence using tools designed for non-programmers. This course gives students understanding of and experience with installing and customizing websites using tools such as Blogs, Wikis, content management systems, and website toolkits. (Prerequisites: ISTE-105 or ISTE-140 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall)**

ISTE-330**Database Connectivity and Access**

In this course, students will build applications that interact with databases. Through programming exercises, students will work with multiple databases and programmatically invoke the advanced database processing operations that are integral to contemporary computing applications. Topics include the database drivers, the data layer, connectivity operations, security and integrity, and controlling database access. (Prerequisites: (ISTE-230 or CSCI-320) and (ISTE-120 or GCIS-124 or CSCI-140 or CSCI-142 or CSCI-242) or equivalent courses.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

ISTE-340**Client Programming**

This course will explore the analysis, design, development, and implementation of client-side programming in the context of Internet technologies, mobile devices, Web-based client systems and desktop applications. Students will learn to design and build usable and effective interactive systems, clients, and interfaces. Key features addressed will include browser and platform compatibility, object reusability, bandwidth and communications issues, development environments, privacy and security, and related technologies and APIs. Programming is required. (Prerequisites: (ISTE-240 or IGME-330) and (GCIS-124 or ISTE-121 or ISTE-200 or CSCI-142 or CSCI-140 or IGME-106 or IGME-102) or equivalent courses.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

ISTE-341**Server Programming**

This course provides in-depth work in server-side programming. Students will develop dynamic, data centric web pages and systems, and server-side information services that will be available to clients implemented in a variety of software technologies. Topics include XML parsing, generation, and consumption; web configuration and security; design patterns; web service structures, and application security. Programming projects are required. (Prerequisites: ISTE-340 and (ISTE-230 or CSCI-320) and (SWEN-383 or SWEN-262) or equivalent courses.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

ISTE-358**Foundations of Wearable and Ubiquitous Computing**

Wearable technologies, like smart watches, and ubiquitous computing technologies, including the Internet of Things, are entering the mainstream. In this introductory course, students will learn the history of research in these areas and fundamentals of developing for these devices, including interface design, networking, physical form factors; societal issues such as privacy will also be discussed. This class is primarily project-based. (Prerequisites: ISTE-341 and ISTE-252 or equivalent courses.) **Lec/Lab 3, Credits 3 (Fall)**

ISTE-371**Integration in Informatics**

This course is the capstone for the applied informatics minor. Students will use mashup tools along with their programming and database skills to develop a project, based on their major's domain, which demonstrates the work of an informatician. The course utilizes extensive hands-on computing, including programming and database work. (This class is restricted to non-computing majors. Students in GCCIS are not eligible to take this course.) **Lec/Lab 2, Credits 2 (Spring)**

ISTE-405**Web Integration and Application**

The final course in the minor in web design and development (for non-GCCIS majors). Students will develop a deeper understanding of technologies underlying the web and how to combine them. This course builds upon the work from the preceding four courses in the minor and emphasizes integrating multiple technologies and content sources to create sophisticated websites and web applications for desktop and mobile devices. This course is not available to GCCIS majors. (Prerequisites: ISTE-305 or equivalent course.) **Lec/Lab 3, Credits 3 (Spring)**

ISTE-422**Application Development Practices**

In this course, students will gain experience with the processes, practices, and tools professional developers use to deliver robust and maintainable applications. Students will apply these practices and tools to build smaller-scale production-quality applications and systems. Topics include development life cycles, version control, test bed development and use, build utilities, error handling, deployment tools, and documentation. (Prerequisites: ISTE-121 or ISTE-200 or CSCI-142 or CSCI-140 or IGME-106 or CSCI-242 or GCIS-124 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

ISTE-424**Distributed Application Systems Development**

Program code and functionality of larger-scale systems are typically distributed across multiple servers. In this course, students will work with messaging middleware and enterprise development frameworks typically used in industry. Programming projects will be required. (Prerequisites: ISTE-341 or equivalent course.) **Lec/Lab 3, Credits 3 (Spring)**

ISTE-430**Information Requirements Modeling**

Students will survey and apply contemporary techniques used in analyzing and modeling information requirements. Requirements will be elicited in a variety of domains and abstracted at conceptual, logical, and physical levels of detail. Process, data, and state modeling will be applied in projects that follow a systems development lifecycle. Object-oriented modeling will be explored and contrasted with data and process oriented modeling. Individual and team modeling assignments will be required. (Prerequisites: ISTE-230 or CSCI-320 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

ISTE-432**Database Application Development**

Database applications have aspects that need to be considered when designing and developing larger-scale systems. In this course students will explore topics such as concurrent processing, scalability, performance, and security within the context of developing larger-scale data/base information processing systems. Programming projects are required. (Prerequisites: ISTE-330 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

ISTE-434**Data Warehousing**

This course covers the purpose, scope, capabilities, and processes used in data warehousing technologies for the management and analysis of data. Students will be introduced to the theory of data warehousing, dimensional data modeling, the extract/transform/load process, warehouse implementation, and summary-data management. The basics of data mining and importance of data security will also be discussed. Hands-on exercises include implementing a small-scale data warehouse. (Prerequisites: ISTE-230 or CSCI-320 or equivalent course and 3rd year standing.) **Lec/Lab 3, Credits 3 (Fall)**

ISTE-436**Database Management and Access**

Students will be introduced to issues in client/server database implementation and administration. Students will configure, test, and establish client-server communication and server-server communication with single and multiple database servers. Topics such as schema implementation, storage allocation and management, user creation and access security, backup and recovery, and performance measurement and enhancement will be presented in lecture and experienced in a laboratory environment. Students will configure and demonstrate successful communication between a database file server and multiple clients. (Prerequisite: ISTE-230 or equivalent course.) **Lec/Lab 3, Credits 3 (Spring)**

ISTE-438**Contemporary Databases**

This course will introduce the topic of contemporary databases by covering the design, application and use of non-relational (NoSQL) database technologies. Topics include an overview of data types, structuring and processing data and knowledge, data transformation, and data storage and warehousing. Students will learn the interaction between relational and non-relational databases in the Cloud or other storage media. Programming assignments will be required. (Prerequisites: (ISTE-230 or CSCI-320) and ISTE-240 or IGME-330) or equivalent courses.) **Lec/Lab 3, Credits 3 (Spring)**

ISTE-442**Secure Web Application Development**

When building larger-scale web applications, there are a myriad of concerns that range from technology, security, framework, and architecture selection to runtime performance optimization. This course focuses on the development of secure integrated web applications that consume information served from one or many sources. Trends in web application development are identified and assessed. Programming projects are required. (Prerequisites: ISTE-341 or equivalent courses.) **Lec/Lab 3, Credits 3 (Fall)**

ISTE-444**Web Server Development and Administration**

Web developers often need to go beyond building web pages and client-server programming to plan, install, configure, develop, and maintain the Web servers that host their sites. They need to understand issues of scalability, performance, and security as they apply to deploying a web presence. This course provides a practical hands-on approach to development, configuration, and administration of web server platforms. Topics include issues of and approaches to scalability, multiple server systems, security, and auditing, as well as the many configuration options, modules, and server alternatives available. (Prerequisites: ISTE-341 or equivalent course.) **Lec/Lab 3, Credits 3 (Spring)**

ISTE-454**Mobile Application Development I**

This course extends the material covered in the Foundations of Mobile Design course and provides students with the experience of creating interesting applications for small-size form factor mobile devices such as smartphones. These devices are exceptionally portable, have unique sets of hardware and communications capabilities, incorporate novel interfaces, are location aware, and provide persistent connectivity. Students are encouraged to make creative use of these unique device characteristics and operating properties to develop innovative applications. Programming projects are required. (Prerequisites: (ISTE-252 and ISTE-340) or IGME-330 or equivalent courses.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

ISTE-456 Mobile Application Development II
 This course extends the Foundations of Mobile Design course in that students will learn to apply mobile design skills to develop applications in the Android platform. Students will design, develop, and test mobile applications using the Android Studio IDE. This course covers the major components such as activities, receivers, content providers, permissions, intents, fragments, data storage, and security. Programming projects are required (Prerequisites: (ISTE-252 and ISTE-340) or IGME-330 or equivalent courses.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

ISTE-458 Advanced Topics in Wearable and Ubiquitous Computing
 This course is a sequel to ISTE-358, Foundations of Wearable and Ubiquitous Computing. In this advanced course, students will further their understanding of these technologies and what they can do. A major emphasis will be on context and activity recognition; for example, automatically understanding what a person is doing or whom they are with. This class is primarily project-based. (Prerequisites: ISTE-358 or equivalent course.) **Lec/Lab 3, Credits 3 (Spring)**

ISTE-464 Accessibility Through the Lifespan
 Students will explore how accessibility and assistive technologies intersect with aging throughout the lifespan, with a particular focus on the early and later stages of human development, including: educational contexts (for children or young adults) and effective design strategies for promoting accessibility for older adults with diverse capabilities. Students will learn key legal regulations that govern special education and accessibility in educational contexts, including the provision of assistive technologies and the accessibility of instructional technologies. Students will also explore typical changes in ability and impairments that relate to the human aging process, and they will investigate how to design usable and engaging technology for the growing population of older adults. Students will come to understand the concepts and needs of younger and older users firsthand through, e.g., guest speakers or personal interactions. (Prerequisites: ISTE-266 or equivalent course.) **Lec/Lab 3, Credits 3 (Spring)**

ISTE-470 Data Mining and Exploration
 Rapidly expanding volumes of data from all areas of society are becoming available in digital form. High value information and knowledge is embedded in many of these data volumes. Unlocking this information can provide many benefits, and may also raise ethical questions in certain circumstances. This course provides students with a hands-on introduction to how interactive data exploration and data mining software can be used for data-driven knowledge discovery, including domains such as business, environmental management, healthcare, finance, and transportation. Data mining techniques and their application to large data sets will be discussed in detail, including classification, clustering, association rule mining, and anomaly detection. In addition, students will learn the importance of applying data visualization practices to facilitate exploratory data analysis. (Prerequisites: (STAT-145 OR MATH-251) and (GCIS-124 OR ISTE-121 OR CSCI-140 OR CSCI-142 OR CSCI-242 OR ISTE-200 OR IGME-201 OR IGME-106) or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

ISTE-472 Text Analytics
 This course covers fundamental concepts and technologies for the management and analysis of unstructured textual data. Topics include encoding, indexing, preprocessing, storing, searching, processing, and presenting textual information using fully automatic systems. Analytic techniques, such as categorization and clustering, and link analysis, are introduced that allow students to process and analyze textual data, discover patterns and knowledge, and interpret the results. Students use text analytics existing APIs and tools to design experiments for exploring the behavior of basic text analytic techniques. (Prerequisites: ISTE-121 and ISTE-230 and MATH-131 and STAT-146 or equivalent courses and minimum of 3rd year standing.) **Lec/Lab 3, Credits 3 (Fall)**

ISTE-474 Social and Web Analytics
 From the social computing perspective, user interactions create user-generated content. Examples of user-generated content include blogs and wikis, reports of location, activity, plans and schedules, and patterns of interaction. This course will provide students with the knowledge and tools to extract information from user-generated content and to use this information to build user-centric applications with high degrees of personalization. Through development projects, students will gain experience using social network APIs and with developing social-oriented mashups. Security and privacy concerns are emphasized. (Prerequisites: ISTE-341 and ISTE-472 or equivalent courses.) **Lec/Lab 3, Credits 3 (Spring)**

ISTE-476 Visual Analytics
 This course introduces students to Visual Analytics, or the science of analytical reasoning facilitated by interactive visual interfaces. Course lectures, reading assignments, and practical lab experiences will cover a mix of conceptual, practical and technical Visual Analytics topics. Topics include analytical reasoning, human cognition and perception of visual information, visual representation and interaction technologies, data representation and transformation, production, presentation, and dissemination of analytic process results, and Visual Analytics case studies and applications. (Prerequisites: ISTE-260 and ISTE-472 or equivalent courses.) **Lec/Lab 3, Credits 3 (Fall)**

ISTE-482 Geospatial Data Analysis
 This course is an introduction to the theory and techniques used for spatial analysis of complex, geographically referenced data. Topics include spatial data analysis and statistical techniques for a variety of problem types that span a broad spectrum of disciplines. In-class and out-of-class assignments will develop students spatial data analysis skills. (Prerequisites: ISTE-384 and STAT-146 or equivalent courses.) **Lec/Lab 3, Credits 3 (Fall)**

ISTE-483 Information Science and Technology Research
 This course is for students enrolled in the BS IT degree program and minors to demonstrate competence in concepts, techniques and applications via a semester-length research project developed in conjunction with a faculty member and based on the student's degree concentration or minor. With instructor guidance, students will learn how to formulate a research question, choose relevant methods to answer the question, execute the project and present results in a public forum. (This class is restricted to degree seeking students with at least 4th year level.) **Lecture 3, Credits 3 (Spring)**

ISTE-490 Futuring
 This course teaches students to evaluate and exploit emerging technologies through the use of futuring techniques in the areas of society, technology, politics, and economics. Techniques include Delphi, modeling, regression models, and scanning. Students also are introduced to an innovation life cycle, describing the origination points of technology, and will discuss diffusion of innovation. Consequences of technology are discussed and modeled and used as a means to evaluate technologies. Some programming is required. (Prerequisites: (ISTE-100 or ISTE-120 or ISTE-200 or ISTE-202) and STAT-146 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

ISTE-498 Undergraduate Creative, Innovative or Research Experience
 Students may substitute the second block of traditional co-op experience with creative, innovative or research (iSchool CIR) activities as long as it is directly related to the applicant's degree. Examples include contributing to research projects, supervised participation in entrepreneurial activities, and cross-disciplinary innovation projects not otherwise eligible for co-op. Students will follow a structured application process prior to registering for the course. They will submit a plan of work that outlines the proposed activities, defines tangible goals and deliverables, and identifies a person (faculty member, business contact, etc.) who will provide oversight throughout the term. At the conclusion of the term, students will follow an assessment process similar to that used for traditional co-op as well as (submission of evaluation of responsible oversight party, their daily time and activity logs, the students report and an announced presentation – see iSchool CIR Experience Guidelines on the web at <https://ischool.rit.edu/> > Student Resources > Co-op Enrollment for further information). (Prerequisites: ISTE-499 or equivalent course.) **CO OP, Credits 0 (Fa/sp/su)**

ISTE-499 Undergraduate Co-op
 Students perform paid, professional work related to their program of study. Students work full-time during the term they are registered for co-op. Students must complete a student co-op work report for each term they are registered; students also are evaluated each term by their employer. A satisfactory grade is given for co-op when both a completed student co-op report and a corresponding employer report that indicates satisfactory student performance are received. (Enrollment in this course requires permission from the department offering the course.) **CO OP, Credits 0 (Fall, Spring, Summer)**

ISTE-500 Senior Development Project I
 The first course in a two-course, senior level, system development capstone project. Students form project teams and work with sponsors to define system requirements. Teams then create architectures and designs, and depending on the project, also may begin software development. Requirements elicitation and development practices introduced in prior coursework are reviewed, and additional methods and processes are introduced. Student teams are given considerable latitude in how they organize and conduct project work. (This course is restricted to WMC-BS, HCC-BS, CMIT-BS, and 2 ISTE-499 completed or (1 ISTE-498 completed and 1 ISTE-499 completed).) **Lecture 3, Credits 3 (Fall, Spring)**

ISTE-501 Senior Development Project II
 The second course in a two-course, senior level, system development capstone project. Student teams complete development of their system project and package the software and documentation for deployment. Usability testing practices introduced in prior course work are reviewed, and additional methods and processes are introduced. Teams present their developed system and discuss lessons learned at the completion of the course. (Prerequisites: ISTE-500 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

ISTE-560 Fundamentals of Instructional Technology
 Instructional Technology encompasses the basic processes for developing and delivering instruction. Instructional Systems Design (ISD) is a well-established methodology for describing knowledge and skills and developing instructional systems to effectively convey knowledge. This course enables the student to plan, organize, and systematically develop instructional materials. The course uses an ISD model to analyze, design, deliver, and evaluate instruction. **Lecture 3, Credits 3 (Fall)**

ISTE-561**Interactive Courseware**

Instructional software is referred to as courseware. This course is a continuation of Fundamentals of Instruction Technology (ISTE-560), and serves as a transition from general instructional design principles to the actual application of these principles in a computer-based environment. Using teaching and learning principles is somewhat different when developing instruction that will be delivered by computer. This course teaches techniques that have been successful in the design and development of courseware as well as reviewing current theories and models. (Prerequisites: ISTE-560 and ISTE-121 or GCIS-124 or equivalent courses.)

Lecture 3, Credits 3 (Spring)

ISTE-562**Research in Accessibility**

Students will dive into cutting edge research in the field of computer accessibility and assistive technology; they will read, present, and discuss research literature from major conferences and journals in the field. Students will learn about recent developments and ongoing research efforts in accessibility, and they will learn how to synthesize the results from research publications. Students will learn how to identify high quality research and how to critique this work to identify areas for improvement or future research directions. Students will learn the elements of a high-quality research publication, and they will explore and gain expertise in a particular topic in the field of accessibility in depth. (Prerequisites: ISTE-266 and PSYC-251 or equivalent course.)

Lecture 3, Credits 3 (Fall)

ISTE-563**Access and Assistive Technology**

Students will gain hands-on experience and knowledge about a wide variety of accessibility and assistive technology available for people with disabilities. Students will understand the design principles underlying this technology and how the features and capabilities of assistive technology can be tailored to a particular individual's needs and capabilities. Students will learn about how new technologies and research in accessibility can be made available for users, and they will learn how to design websites and software that work effectively with a user's own technology. Specific technologies discussed in the course may include, e.g.: alternative input devices, communication devices, and screen readers and magnifiers for people with visual impairments. Programming is required. (Prerequisites: ISTE-266 or equivalent course.)

Lec/Lab 3, Credits 3 (Spring)

ISTE-590**Information Technology Seminar**

This course explores emerging topics in Information Technology. The faculty member(s) who offer an Information Technology seminar course determine specific course parameters such as prerequisites, format, learning outcomes, and assessment methods.

Lecture, Credits 1 - 4 (Fall, Spring, Summer)

ISTE-599**Information Technology Undergraduate Independent Study**

Independent study offers a student an opportunity to explore, in greater depth, a topic previously introduced in a prior course or a topic of special interest. A faculty member supervises the student's work. A student and faculty member will collaboratively develop an independent study proposal that describes the student's plan of work, expected deliverables, evaluation criteria, and number of credits that will be earned. Requires department consent. (Enrollment in this course requires permission from the department offering the course.)

Ind Study, Credits 1 - 3 (Fall, Spring, Summer)

Interactive Games and Media

IGME-099**Co-op Preparation Workshop**

This course helps students prepare for co-operative education employment ("co-op") by developing job search strategies and material. Students will explore current and emerging aspects of IGM fields to help focus their skill development strategies. Students are introduced to RIT's Office of Career Services and Cooperative Education, and learn about professional and ethical responsibilities for their co-op and subsequent professional experiences. Students will work collaboratively to build résumés and digital portfolios, and to prepare for interview situations. (This course is restricted to NWMEDID-BS or GAMEDES-BS or COMPEX-UND students with at least second year standing.)

Lecture 1, Credits 0 (Fall, Spring)

IGME-101**New Media Interactive Design and Algorithmic Problem Solving I**

This course provides students with an introduction to problem solving, abstraction, and algorithmic thinking that is relevant across the field of new media. Students are introduced to object-oriented design methodologies through the creation of event-driven, media-intensive applications. Students will explore the development of software through the use of a range of algorithmic concepts related to the creation of applications by writing classes that employ the fundamental structures of computing, such as conditionals, loops, variables, data types, functions, and parameters. There is an early emphasis on object oriented concepts and design. (This course is restricted to students in NWMEDID-BS or NMDE-BFA with at least 2nd year standing or GAMED-MN students.)

Lec/Lab 6, Credits 4 (Fall, Spring)

IGME-102**New Media Interactive Design and Algorithmic Problem Solving II**

This course provides students a continued introduction to problem solving, abstraction, and algorithmic thinking that is relevant across the field of new media. As the second course in programming for new media students, this course continues an object-oriented approach to programming for creative practice. Topics will include re-usability, data structures, rich media types, event-driven programming, loaders, XML, object design, and inheritance. Emphasis is placed on the development of problem-solving skills as students develop moderately complex applications. (Prerequisites: C- or better in IGME-101 or equivalent course and students in NWMEDID-BS or NMDE-BFA with at least 2nd year standing or GAMED-MN students.)

Lec/Lab 6, Credits 4 (Fall, Spring)

IGME-105**Game Development and Algorithmic Problem Solving I**

This course introduces students within the domain of game design and development to the fundamentals of computing through problem solving, abstraction, and algorithmic design. Students will learn the basic elements of game software development, including problem decomposition, the design and implementation of game applications, and the testing/debugging of their designs. (This course is restricted to GAMEDES-BS Major students.)

Lec/Lab 6, Credits 4 (Fall, Spring)

IGME-106**Game Development and Algorithmic Problem Solving II**

This course furthers the exploration of problem solving, abstraction, and algorithmic design. Students apply the object-oriented paradigm of software development, with emphasis upon fundamental concepts of encapsulation, inheritance, and polymorphism. In addition, object structures and class relationships comprise a key portion of the analytical process including the exploration of problem structure and refactoring. Intermediate concepts in software design including GUIs, threads, events, networking, and advanced APIs are also explored. Students are also introduced to data structures, algorithms, exception handling and design patterns that are relevant to the construction of game systems. (Prerequisites: C- or better in IGME-105 or equivalent course and student standing in the GAMEDES-BS program.)

Lec/Lab 6, Credits 4 (Fall, Spring)

IGME-110**Introduction to Interactive Media**

This course provides an overview of media in historical, current and future contexts. Incorporating lectures and discussion with hands on work involving written and interactive media assets, students examine the role of written and visual media from theoretical as well as practical perspectives. The course also provides an introduction to interactive media development techniques, including digital media components and delivery environments. Students will be required to write formal analysis and critique papers along with digital modes of writing including collaborative editing and effective presentation design. (This course is restricted to 1st - 3rd year students in NWMEDID-BS and GAMEDES-BS.)

Lab 3, Credits 3 (Fall, Spring)

IGME-110**Introduction to Interactive Media**

This course provides an overview of media in historical, current and future contexts. Incorporating lectures and discussion with hands on work involving written and interactive media assets, students examine the role of written and visual media from theoretical as well as practical perspectives. The course also provides an introduction to interactive media development techniques, including digital media components and delivery environments. Students will be required to write formal analysis and critique papers along with digital modes of writing including collaborative editing and effective presentation design. (This course is restricted to 1st - 3rd year students in NWMEDID-BS and GAMEDES-BS.)

Lecture 3, Credits 3 (Fall, Spring)

IGME-115**Game Development and Algorithmic Problem Solving for Programmers I**

This course presents an introduction to the fundamentals of computing through problem solving, abstraction, and algorithmic design within the domain of game design and development. This course is designed for students with previous experience in programming and will reinforce the concepts of problem decomposition, implementation of a program in a high-level programming language, and testing/debugging of their designs. Students will be introduced to the basic elements of game software development, design of game applications, and applying basic programming knowledge to the game domain. (Enrollment in this course requires permission from the department offering the course.)

Lecture 4, Credits 4 (Fall)

IGME-116**Game Development and Algorithmic Problem Solving for Programmers II**

This course furthers the exploration of problem solving, abstraction and algorithmic design through the development of their skills in computer programming in the domain of game design and development. Students will deepen their understanding of the object-oriented paradigm of software development through the introduction of data structures, algorithms, exception handling, and design of larger-scale software programs. Students are introduced to realizing their game designs using GUIs and advanced APIs for supporting game development. (Prerequisite: C- or better in IGME 115 or equivalent course.)

Lecture 4, Credits 4 (Spring)

IGME-119 2D Animation and Asset Production
This course provides a theoretical framework covering the principles of animation and its use in game design to affect user experience. Emphasis will be placed upon principles that support character development and animations that show cause and effect. Students will apply these principles to create animations that reflect movement and character appropriate for different uses and environments. (This course is restricted to students in GAMEDES-BS or NWMEDID-BS or GAMED-MN students.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

IGME-151H Honors Seminar
This honors seminar is a foundational course that examines how our social worlds are linked to our physical, technological and material worlds. The corresponding emphasis on inquiry, analysis, and interpretation facilitates student-engaged learning. In exploring pertinent issues/topics through an experiential, active, and site-specific curricular focused learning, various aspects of the human condition are discovered. The honors seminar integrates the required Year One curriculum. (This class is restricted to students in the Honors program.) **Lecture 3, Credits 3 (Fall)**

IGME-152H Maps as New Media
This course focuses on Maps, Mapping, and Geographic Experience. Students will gain hands-on experience with technologies such as Global Positioning Systems (GPSs), Geographic Information Science and Technology (GIS & T), remote sensing, mobile device mapping applications and map-based games. Through active, hands on, experiential learning, students will learn how to use GIS & T to create geographical experiences. GIS & T is a support mechanism for spatially-oriented thinking, reasoning, literacy, and problem-solving. Such problems include international disaster management, climate change, and sustainable development. This honors seminar is a foundational course that examines how our social worlds are linked to our physical, technological and material worlds. The corresponding emphasis on inquiry, analysis, and interpretation facilitates student-engaged learning. In exploring pertinent issues/topics through an experiential, active, and site-specific curricular focused learning, various aspects of the human condition are discovered. The honors seminar integrates the required Year One curriculum. **Lec/Lab 3, Credits 3 (Fall)**

IGME-201 New Media Interactive Design and Algorithmic Problem Solving III
This is the third course in the software development sequence for new media interactive development students. Students further their exploration of problem solving and abstraction through coverage of topics such as GUI development, events, file I/O, networking, threading, and other advanced topics related to the design and development of modern dynamic applications. Programming assignments are an integral part of the course. (Prerequisites: C- or better in IGME-102 or equivalent course and student standing in NWMEDID-BS.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

IGME-202 Interactive Media Development
In this course, students will learn to create visually rich interactive experiences. It is a course in programming graphics and media, but it is also a course on the relationship between ideas and code. Students will explore topics in math and physics by building programs that simulate and visualize processes in the natural world. Assignments will include major programming projects, such as building a virtual world inhabited by digital creatures that display observable behaviors. (Prerequisites: (C- or better in IGME-106 or IGME-116 or IGME-206 or IGME-201) and MATH-185 or equivalent courses and GAMEDES-BS or NWMEDID-BS Major or GAMEDD-MN students.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

IGME-206 Game Development for Programmers
An intensive review of the core features for problem solving within the domain of game design and development for students with a prior software development background. Topics include using existing frameworks, game software architecture, data structures, algorithms, threads, object-oriented design, and data-oriented development appropriate for games, simulations, or entertainment applications. Programming assignments are a required part of this course. **Lecture 4, Credits 4 (Fall)**

IGME-209 Data Structures and Algorithms for Games and Simulations I
This course focuses upon the application of data structures, algorithms, and fundamental Newtonian physics to the development of video game applications, entertainment software titles, and simulations. Topics covered include 3D coordinate systems and the implementation of affine transformations, geometric primitives, and efficient data structures and algorithms for real-time collision detection. Furthermore, Newtonian mechanics principles will be examined in the context of developing game and entertainment software where they will be applied to compute the position, velocity and acceleration of a point-mass subject to forces and the conservation of momentum and energy. Programming assignments are a required part of this course. (Prerequisites: (C- or better in IGME-116 or IGME-106 or IGME-206 or IGME-201 or equivalent course and GAMEDES-BS or NWMEDID-BS students) or (C- or better in CSCI-140 or CSCI-142 or CSCI-242 or ISTE-121 or equivalent course and GAMEDD-MN students.) **Lab 3, Credits 3 (Fall, Spring)**

IGME-219 3D Animation and Asset Production
This course provides an overview of 3D game asset production. Basic ideas learned within the first asset production course are also revisited within the 3D environs. Topics covered include modeling, texturing, skinning and animation. Emphasis is put on low polygon modeling techniques, best practices in game art production, and effective communication strategies between artists, programmers and designers. (Prerequisites: IGME-119 or equivalent course and student standing in GAMEDES-BS or NWMEDID-BS.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

IGME-220 Game Design and Development I
This course examines the core process of game design, from ideation and structured brainstorming in an entertainment technology context through the examination of industry standard processes and techniques for documenting and managing the design process. This course specifically examines techniques for assessing and quantifying the validity of a given design, for managing innovation and creativity in a game development-specific context, and for world and character design. Specific emphasis is placed on both the examination and deconstruction of historical successes and failures, along with presentation of ethical and cultural issues related to the design and development of interactive software and the role of individuals in a team-oriented design methodology. Students in this class are expected to actively participate and engage in the culture of design and critique as it relates to the field. (This course is restricted to students in GAMEDES-BS or NWMEDID-BS or GAMED-MN or GAMEDD-MN YR 2-5 students.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

IGME-230 Website Design and Implementation
This course provides an introduction to web development tools and technologies that are widely used in the development and distribution of content-focused websites and interactive web applications. Students will produce such websites and applications, and publish them using modern techniques. Programming projects are required. (Prerequisites: IGME-102 and (IGME-110 or NMDE-103) or equivalent courses and students in NWMEDID-BS or NMDE-BFA programs. Students cannot take and receive credit for this course if they have taken IGME-235.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

IGME-235 Introduction to Web Technology for Game Developers
This course introduces web technologies commonly used in the production and distribution of both content focused web sites, and in the creation of interactive applications and games. Students will create web sites and web-native interactive experiences, and publish them to the web. Programming projects are required. (Students must be in GAMEDES-BS or NWMEDID-BS and have completed (IGME-102, IGME-106, IGME-116 or IGME-206) and IGME-110. Students cannot take and receive credit for this course if they have taken IGME-230.) **Lecture 3, Credits 3 (Fall, Spring)**

IGME-236 Experience Design for Games and Media
This course examines the concepts of interface and interaction models in a media-specific context, with particular emphasis on the concept of the immersive interface. This course explores concepts such as perception, expectation, Gestalt Theory, interactivity, Semiotics, presence, and immersion in the context of media application development and deployment. In addition, underlying concepts of cognitive psychology and cognitive science will be integrated where appropriate. These theories are then integrated in the exploration of the immersive interface, and with related concepts such as user-level-interface modification, augmentation of identity, and the interface as a social catalyst. (Prerequisites: (IGME-102 or IGME-106 or IGME-206) and IGME-110 or equivalent courses and in GAMEDES-BS or NWMEDID-BS programs.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

IGME-309 Data Structures and Algorithms for Games and Simulations II
This course continues the investigation into the application of data structures, algorithms, and fundamental Newtonian mechanics required for the development of video game applications, simulations, and entertainment software titles. Topics covered include quaternion representation of orientation and displacement, cubic curves and surfaces, classifiers, recursive generation of geometric structures, texture mapping, and the implementation of algorithms within game physics engines for collision detection and collision resolution of rigid bodies, and the numerical integration of the equations of motion. In addition, advanced data structures such as B+ trees and graphs will be investigated from the context of game application and entertainment software development. Programming assignments are a requirement for this course. (Prerequisites: IGME-209 and (MATH-171 or MATH-181 or MATH-181A) and (MATH-185 or MATH-241) and (PHYS-111 or PHYS-211 or (PHYS-206 and PHYS-208)) or equivalent courses and student standing in GAMEDES-BS or NWMEDID-BS or GAMEDD-MN.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

IGME-317**3D Asset Production Pipeline for Videogames**

There is a need in the video game industry for 3D artists who have an understanding of the specific techniques used when creating game assets. This course is intended to give art students an overview of how 3D asset creation for video games differs from other media. Students with 3D art experience will be exposed to the skills necessary to produce game ready 3D art assets, and to participate in the creation of a completed video game. The entire video game asset production pipeline will be covered, with a focus on 3D game asset development topics such as low-poly modeling, model and texture optimization, reducing draw calls, joint/rigging limitations, and animation limitations. Students will work on a multi-disciplinary video game team, and create 3D art assets for the game. Proficiency with 3D modeling, UV unwrapping, texturing, rigging, and animation is required. (This course is restricted to undergraduate students in CIAS with at least 2nd year standing.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

IGME-320**Game Design and Development II**

This course continues to examine the core theories of game design as they relate to the professional field. Beginning with a formalized pitch process, this course examines the design and development paradigm from story-boarding and pre-visualization through rapid iteration, refinement, and structured prototyping exercises to further examine the validity of a given design. Specific emphasis is placed on iterative prototyping models, and on methodologies for both informal and formal critique. This course also explores production techniques and life-cycle in the professional industry. (Prerequisites: (IGME-202 and IGME-220 or equivalent courses and GAMEDES-BS or NWMEDID-BS or GAMEDD-MN students) or (IGME-102 and IGME-220 or equivalent courses and GAMED-MN students).) **Lec/Lab 3, Credits 3 (Fall, Spring)**

IGME-330**Rich Media Web Application Development I**

This course provides students the opportunity to explore the design and development of media-rich web applications that utilize both static and procedurally manipulated media such as text, images and audio. This course examines client and server-side web development and features common to such applications. Issues explored include framework characteristics, information management, presentation, interactivity, persistence, and data binding. Programming projects are required. (Prerequisites: IGME-230 or IGME-235 or equivalent course and student standing in GAMEDES-BS or NWMEDID-BS.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

IGME-330H**Honors Rich Media Web Application Development I**

This course provides students a challenging introduction to the design and development of media-rich web applications that utilize both static and procedurally manipulated media such as text, images and audio. This course also examines web and interactive development and code architectures that are common to such applications. Students taking this course must be able to work independently and engage in directed research activities related to framework characteristics, information management, presentation, interactivity, persistence, and data binding. Programming projects are required. (Prerequisites: IGME-230 or IGME-235 or equivalent course and student standing in GAMEDES-BS or NWMEDID-BS and Honors Standing.) **Lab 3, Credits 3 (Fall, Spring)**

IGME-340**Multi-platform Media App Development**

Interactive media applications are no longer restricted to personal computers. They can now be found on many distinct hardware platforms including mobile, tablet, wearable, and large-screened computing devices. In this course, students will learn to design, prototype and develop media rich interactive experiences that can be deployed to a wide variety of hardware devices. Programming projects are required. (Prerequisites: IGME-330 or equivalent course and student standing in GAMEDES-BS or NWMEDID-BS.) **Lecture 3, Credits 3 (Fall, Spring)**

IGME-350**International Game Industry**

This course will immerse students in the international games industry via a study-abroad experience in a location that will vary. The course will hold several meetings on campus before departure, but then the bulk of the course will center on a two-plus-week intensive experience abroad. While abroad, RIT students will spend half the course on the campus of a host university where they will participate in classes and/or other academic offerings, participate in a weekend game jam at the host university, and visit local and regional sites with cultural, historical, and/or game industry significance. Students will spend the rest of the course in a major city center of game development visiting game studios, governmental offices related to the games industry, and/or cultural and historical sites. This course has been offered for both Germany (the largest European games market) and Japan. Other offerings in other countries may emerge over time and the country visited varies for year to year. International travel is required. (Prerequisites: IGME-320 or IGME-330 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

IGME-382**Maps, Mapping and Geospatial Technologies**

This course provides a survey of underlying concepts and technologies used to represent and understand the earth, a form of new media collectively referred to as Geospatial Technologies (GTs). Students will gain hands-on experience with GTs, including Global Positioning Systems (GPSs), Geographic Information Systems (GISs), remote sensing, Virtual Globes, and geographically-oriented new media such as mapping mashups. Students also will develop basic spatial thinking, reasoning, problem solving, and literacy skills. **Lec/Lab 3, Credits 3 (Fall)**

IGME-384**Introduction to Geographic Information Systems**

This course introduces students to Geographic Information Systems (GIS) for understanding and representing people, places and culture through new media. Through applied research projects, students will learn how GIS is a support mechanism for spatially-oriented thinking, reasoning, literacy, and problem-solving at the global scale. Such global problems include international disaster management, digital humanities, climate change, and sustainable development. Course lectures, writing and reading assignments, and in-class activities cover a mix of conceptual, practical and technical GIS topics. Topics include interactions among people, places and cultures around the world, GIS data models, basic cartography, geodatabases, spatial data acquisition and creation, and spatial analysis. This general education course also examines GIS ethical issues such as privacy, information ownership, accuracy, and mapping and social power. **Lec/Lab 3, Credits 3 (Spring)**

IGME-386**Spatial Algorithms and Problem Solving**

This course is targeted to students with a serious interest in geographical problem solving via underlying spatial algorithms. Students will learn how to compare and contrast different specific spatial algorithms for solving specific geographic problems and develop proficiency with encoding and implementing spatial algorithms in computer programs. Students taking this course will gain a broad interdisciplinary skill set in how to think spatially and computationally through critical engagement of geographical problem solving. (This class is restricted to undergraduate students with at least 2nd year standing.) **Lecture 3, Credits 3 (Fall)**

IGME-420**Level Design**

This course introduces level design theory and best practice through game level analysis, evaluation, and creation. Students will learn by analyzing game levels from existing games and discussing what made those levels successful or unsuccessful. Through their analysis and hands on experience, students will gain an understanding of overall level design including layout, flow, pacing, and balance. They will enhance their understanding of level design principles by creating their own game levels. (Prerequisites: IGME-219 and IGME-220 or equivalent courses and student standing in NWMEDID-BS or GAMEDES-BS.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

IGME-422**Level Design 2**

This course expands upon the level design concepts presented in IGME-420, further exploring advanced level design topics and applying them to additional game genres. The course delves deeper into level design processes and methodologies as they relate to more complex game types using a project-based format. Throughout the course, various game genres will be studied and explored, with projects including game analysis and the creation of custom levels. (Prerequisites: IGME-420 or equivalent course.) **Lab 3, Credits 3 (Fall, Spring)**

IGME-423**Games for Change**

This course provides students with the opportunity to explore games and simulations for social change and learning. Students will explore various research, design, and development techniques for applying games to addressing issues and problems in communities, from local to global. Students will learn to design and develop games and simulations as well as how to gather and analyze data about the games' usage. Topics may include issues-based organizing and advocacy, place-based learning, and games for civics. In addition, students are exposed to current debates in the field of Games for Change. (Prerequisites: IGME-220 or equivalent course and GAMEDES-BS or NWMEDID-BS Major students.) **Lecture 3, Credits 3 (Fall, Spring)**

IGME-430**Rich Media Web Application Development II**

This course provides students the opportunity to continue the exploration of Media Rich Internet Applications (MRIAAs). Topics include communications for media ecologies, distributed web application frameworks, advanced interactivity, data transformation, representation, automation, persistence, and large scale systems deployment. In addition, students are exposed to concepts and technologies related to the next generation of MRIA development. (Prerequisites: IGME-330 or equivalent course and student standing in GAMEDES-BS or NWMEDID-BS.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

IGME-431**Digital Video for the Web**

Web-deployed video is an increasingly important medium. It is used for illustration, instruction, entertainment and marketing. Students working with video for the web require an understanding of its inherent qualities, limitations and how it may be implemented. This course will focus on video and specifically how to create and implement quality work suitable for web delivery. (Prerequisites: IGME-202 and IGME-330 or equivalent courses.) **Lec/Lab 3, Credits 3 (Spring)**

IGME-450**Casual Game Development**

This course explores the design and construction of casual game experiences. Topics include modes of casual game play, mechanics for casual games, characteristics of successful games, development processes, and the distribution of casual games. Students will create casual games, and employ technologies to address issues of scalability, presentation, social interconnectivity, and game analytics. (Prerequisites: IGME-330 or equivalent course and restricted to students in NWMEDID-BS or IGME-320 or equivalent course and restricted to students in GAMEDES-BS.) **Lec/Lab 3, Credits 3 (Spring)**

IGME-451 **Systems Concepts for Games and Media**
This course focuses on systems-based theoretical models of computation in the context of a media-delivery modality. Students will explore concepts such as memory management, parallel processing, platform limitations, storage, scheduling, system I/O, and optimization from a media-centric perspective. Particular emphasis will be placed on the integration of these concepts in relation to industry standard hardware including game consoles, mobile devices, custom input hardware, etc. (Prerequisites: IGME-309 or equivalent course and student standing in GAMEDES-BS or NWMEDID-BS.) **Lec/Lab 3, Credits 3 (Spring)**

IGME-460 **Data Visualization**
Our world is flooded with data, and making sense of it can be a challenge. Visualizations help by exposing information, trends, and correlations that might otherwise go unnoticed in the raw data. In this course, students will learn to collect, clean, organize, and filter data sets of their own choosing. They will learn and apply principles from multiple fields including visual design, the psychology of perception, user experience design, and ethics. They will create static and interactive visualizations with a variety of information structures (hierarchies, maps, timelines, etc.). Students will learn to develop exploratory experiences that tell the story within the data. Programming projects are required. (Prerequisites: IGME-330 or equivalent course.) **Lec/Lab 3, Credits 3 (Spring)**

IGME-470 **Physical Computing and Alternative Interfaces**
The rich variety and widespread adoption of gestural touch screens, motion-sensing devices, weight-reactive surfaces, wearable digital devices, and similar interface products demonstrates the demand for well-integrated devices and services that seamlessly couple people and environments. Such products can interface computers with real-world inputs and outputs, and give people new ways of controlling and experiencing their devices and information. This course provides a rapid technical introduction to basic electronics (components, circuits, micro-controllers, etc.) and emphasizes the application of interface design concepts to physically interactive and innovative product development. The course requires solo and team projects that blend electronics, programming, and design. (Prerequisites: IGME-102 or IGME-106 or IGME-206 or equivalent course and at least 3rd year standing.) **Lec/Lab 3, Credits 3 (Fall)**

IGME-480 **Current Topics in Interactive Development**
Interactive media development is a rapidly evolving field. This course provides an opportunity for students to learn and experiment with emerging themes, practices, and technologies that are not addressed elsewhere in the curriculum. Topics covered in this course will vary based on current developments in the field. Students will explore, design, and develop creative interactive experiences pertaining to the semester's domain area. Programming projects are required. (Prerequisites: IGME-330 or equivalent course and student standing in GAMEDES-BS or NWMEDID-BS.) **Lec/Lab 3, Credits 3 (Spring)**

IGME-484 **Geographic Visualization**
This course examines the use of maps for geographic problem solving and scientific inquiry. Students will learn theory, concepts and techniques associated with maps and new media such as geographic problem solving and scientific inquiry devices such as map comprehension, evaluation, construction, usage, and assessment. Students will also learn how to compare, contrast, and implement map-based geographic problem solving and scientific inquiry techniques with geographically-oriented new media such as thematic cartography, geographic information visualization, three dimensional modeling and animated and interactive maps. A geographic problem solving research project that incorporates thematic cartography and geographic visualization solutions is required. (This class is restricted to undergraduate students with at least 3rd year standing.) **Lecture 3, Credits 3 (Spring)**

IGME-499 **Undergraduate Co-op**
Cooperative education is a work experience designed to supplement the educational process. Students may select from a range of activities designated as cooperative education, including relevant industrial experience, internships, entrepreneurial activities, as well as faculty-supervised research and innovation opportunities. (Prerequisite: IGME-99 or equivalent course.) **CO OP, Credits 0 (Fall, Spring, Summer)**

IGME-529 **Foundations of Interactive Narrative**
This course focuses on the major elements of narrative for interactive environments. Students in this course explore the basics of narrative in the context of interactive games and media, with examination of digital storytelling in games and interactive environments of several varieties. Branching narrative, hypertext, multi- and non-linear concepts are also explored with an emphasis on balancing immersive and interactive aspects of digital narrative. (NWMEDID-BS, GAMEDES-BS) **Lec/Lab 3, Credits 3 (Spring)**

IGME-531 **Aesthetics and Computation**
Students will design and build creative applications, while studying the history of computation in the visual arts, music, and other relevant areas. Technical topics include advanced audiovisual programming techniques, while theoretical topics include foundational discussions on artificial life, generative art, microsound, participatory and process-based art, programming as performance, and computational creativity. Individual and/or group projects will be required. (Prerequisites: IGME-330 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

IGME-540 **Foundations of Game Graphics Programming**
Students will explore the use of an advanced graphics API to access hardware-accelerated graphics in a real-time graphics engine context. The course will involve discussion of scene graphs, optimizations, and integration with the API object structure, as well as input schemes, content pipelines, and 2D and 3D rendering techniques. Students will also explore the advanced use of the API calls in production code to construct environments capable of real-time performance. Students will construct from scratch a fully functional graphics engine, with library construction for game development. (Prerequisites: IGME-309 or equivalent course and student standing in GAMEDES-BS.) **Lec/Lab 3, Credits 3 (Fall)**

IGME-550 **Foundations of Game Engine Design and Development**
This course will provide students with theory and practical skills in game engine design topic areas such as understanding the graphics pipeline as it influences engine design, hardware principles and the relationship to game engine construction, mathematical principles involved in game engine design, scene graph construction and maintenance, texture and materials management, collision systems, physics systems, particle systems, and control systems. Furthermore, this course will examine software and toolsets that assist game engine designers in their tasks. Students will be expected to design and implement a game engine in teams as well as properly document their design and development strategy. (Prerequisites: IGME-540 or equivalent course and student standing in GAMEDES-BS.) **Lec/Lab 3, Credits 3 (Spring)**

IGME-560 **Artificial Intelligence for Game Environments**
This course explores introductory artificial intelligence concepts through both a theoretical and practical perspective, with an emphasis on how to apply these concepts in a game development context. In particular the course focuses on applying concepts such as search, reactive intelligence, knowledge representation, and machine learning to real-time situations and applications as relevant to the field of entertainment technology and simulation. (Prerequisites: IGME-309 or equivalent course and student standing in GAMEDES-BS.) **Lec/Lab 3, Credits 3 (Spring)**

IGME-570 **Digital Audio Production**
Technologies and techniques for producing and manipulating digital audio are explored. Topics include digital representations of sound, digital audio recording and production, MIDI, synthesis techniques, real-time performance issues, and the application of digital audio to multimedia and Web production. (Prerequisites: IGME-202 or equivalent course and student standing in GAMEDES-BS or NWMEDID-BS.) **Lec/Lab 3, Credits 3 (Fall)**

IGME-571 **Interactive Game and Audio**
This course provides students with exposure to the design, creation and production of audio in interactive applications and computer games. Students will become familiar with the use of sound libraries, recording sounds in the studio and in the field, generating sound with synthesizers, and effects processing. Students will create sound designs for interactive media, integrating music, dialog, ambient sound, sound effects and interface sounds within interactive programs. (Prerequisites: IGME-202 or equivalent course and student standing in GAMEDES-BS or NWMEDID-BS.) **Lec/Lab 3, Credits 3 (Spring)**

IGME-580 **IGM Production Studio**
This course will allow students to work as domain specialists on teams completing one or more large projects over the course of the semester. The projects will be relevant to experiences of the interactive games and media programs, but will require expertise in a variety of sub-domains, including web design and development, social computing, computer game development, multi-user media, human-computer interaction and streaming media. Students will learn to apply concepts of project management and scheduling, production roles and responsibilities, and their domain skill sets to multidisciplinary projects. Students will complete design documents, progress reports and final assessments of themselves and their teammates in addition to completing their assigned responsibilities on the main projects. (Prerequisites: IGME-330 or equivalent course and restricted to students in NWMEDID-BS or IGME-320 or equivalent course and restricted to students in GAMEDES-BS.) **Lec/Lab 3, Credits 3 (Fall, Spring, Summer)**

IGME-582 **Humanitarian Free and Open Source Software Development**
This course provides students with exposure to the design, creation and production of Open Source Software projects. Students will be introduced to the historic intersections of technology and intellectual property rights and will become familiar with Open Source development processes, tools and practices. They will become contributing members of humanitarian software, game and interactive media development communities. Students will actively document their efforts on Humanitarian Free and Open Source Software community hubs. (Prerequisites: This class is restricted to students with at least 2nd year standing.) **Lec/Lab 3, Credits 3 (Spring)**

IGME-583**Legal and Business Aspects of FOSS**

The entertainment and software industries are grappling with the impacts of free software digital distribution. Agile development, 3D printing, the Internet and other technologies are changing the face of how business is done, as well as what business can charge for and hold onto. Disruptive technologies, emerging interfaces, and real-time, on-demand product creation and distribution are transforming our entertainment, telecommunications and manufacturing landscapes. This course will examine the impacts of these new technologies and the new thinking that are taking us into these new worlds. (Prerequisites: IGME-582 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall)**

IGME-584**Software Development on Linux Systems**

Students will learn how to package software for release and engage in version maintenance within the FOSS community. Topics such as Linux package management, version control systems, potential license conflicts, development vs. production releases, bug tracking, maintenance management, forking, patching and future development will be covered in from both a management and end-user perspective in lectures, lab exercises and a project. (Prerequisites: IGME-582 or equivalent course.) **Lec/Lab 3, Credits 3 (Spring)**

IGME-585**Project in FOSS Development**

Free and Open Source Software development is an internationally growing methodology for distributing work across multiple developers. The process can be applied to small garage-sized teams (small utility packages, multimedia plugins, simple games) or teams of hundreds (Mozilla, Java, Linux). This course builds on the introductory experience provided in the prerequisite to provide hands-on open-source development experience in a large-scale, project that will be prepared for open-source distribution. The actual projects and domains addressed will vary offering to offering, but will be along the lines of those listed above. (Prerequisites: IGME-582 or equivalent course.) **Lec/Lab 3, Credits 3 (Spring)**

IGME-588**New Media Interactive Development Capstone II**

This course is designed to engage the New Media major in a capstone production experience. The instructor will form interdisciplinary student teams that will design, plan, prototype, and implement new media projects. Student groups are required to test their product with users and provide written feedback and analysis. Students will be evaluated on individual contributions and their team's final capstone project. (Prerequisites: NMDE-401 or equivalent course and student standing in NWMEDID-BS program.) **Lab 3, Credits 3 (Spring)**

IGME-588**New Media Interactive Development Capstone II**

This course is designed to engage the New Media major in a capstone production experience. The instructor will form interdisciplinary student teams that will design, plan, prototype, and implement new media projects. Student groups are required to test their product with users and provide written feedback and analysis. Students will be evaluated on individual contributions and their team's final capstone project. (Prerequisites: NMDE-401 or equivalent course and student standing in NWMEDID-BS program.) **Lecture 2, Credits 3 (Spring)**

IGME-589**Research Studio**

This course will allow students to work as domain specialists on teams completing one or more faculty research projects over the course of the semester. The faculty member teaching the class will provide the research topic(s). Students will learn about research methodology to implement, test, and evaluate results of projects. Students will complete research reports and final assessments of themselves and their teammates in addition to completing their assigned responsibilities on the main projects. (This course is restricted to students in NWMEDID-BS or GAMEDES-BS with 3rd year standing.) **Lec/Lab 3, Credits 3 (Fall, Spring, Summer)**

IGME-590**Undergraduate Seminar in IGM**

This is intended to allow for special one-time offerings of undergraduate topics or to allow faculty to pilot new undergraduate offerings. Specific course details (such as the course topics, format, resource needs, and credit hours) will be determined by the faculty member(s) who propose a given special-topics offering. (This course is restricted to students in NWMEDID-BS or GAMEDES-BS with 3rd year standing.) **Lec/Lab 3, Credits 3 (Fall, Spring, Summer)**

IGME-599**Independent Study**

The student will work independently under the supervision of a faculty advisor on a topic not covered in other courses. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 6 (Fall, Spring, Summer)**

iSchool**ISCH-110****Principles of Computing**

This course is designed to introduce students to the central ideas of computing. Students will engage in activities that show how computing changes the world and impacts daily lives. Students will develop step-by-step written solutions to basic problems and implement their solutions using a programming language. Assignments will be completed both individually and in small teams. Students will be required to demonstrate oral and written communication skills through such assignments as short papers, homework, group discussions and debates, and development of a term paper. Computer Science majors may take this course only with department approval, and may not apply these credits toward their degree requirements. **Lec/Lab 3, Credits 3 (Fall, Spring)**

ISCH-145**Web Page Creation**

A hands-on introduction to web page creation and publishing, intended for non-computing majors. In this introductory course, students will learn how to design and publish websites for both mobile and desktop devices. Students will create a static website using appropriate semantic Hyper Text Markup Language (HTML) and Cascading Style Sheets (CSS) styling rules, and they will learn how to install it on an Institute server. **Lecture 1, Credits 1 (Summer)**

ISCH-201**Computing, Culture and Society**

This course is designed to introduce students to the social impacts of computing technology. The course will provide a brief introduction to ethics and to the history of computing and the Internet. It will focus on a number of areas in which computers and information technology are having an impact on society including privacy, freedom of speech, intellectual property, work, distribution of wealth, algorithmic bias and the environment. Current issues that will be discussed include electronic voting, spyware, spam, and intellectual property issues associated with digital content distribution. Students will be required to demonstrate oral and written communication skills through assignments such as short papers, homework, group discussions, and debates. Computing majors may take this course only with department approval. **Lecture 3, Credits 3 (Fall)**

ISCH-370**PrinciplesOfDataScience**

This course builds on the principles of computing to introduce students to data analytics techniques commonly performed on digital data sets, using a variety of software tools. Students will learn what constitutes data and its associated social, ethical, and privacy concerns, common data acquisition and preparation techniques, and how to perform exploratory data analysis on real-world datasets from several domains. Common statistical and machine learning techniques, including regression, classification, clustering, and association rule mining will be covered. In addition, students will learn the importance of applying visualization for presenting and analyzing data. Students will be required to demonstrate oral and written communication skills through critical thinking homework assignments and both presenting and writing a detailed report for a project to analyze a data set of their choice. GCCIS majors may take this course only with the students' home department approval, and may not apply these credits toward their degree requirements. (Prerequisites: CSCI-101 or ISCH-110 or equivalent course. Students in the B. Thomas Golisano College for Computing and Information Sciences are not eligible to take this class.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

Medical Informatics**MEDI-130****Computers in Medicine**

This course begins with a historical perspective on computing in medicine. It reviews software and hardware from supercomputers to mobile devices, and surveys their use in medical practice, research, and education. Next it studies the nature of medical data, its collection, organization and use. This sets the stage for the major part of the course which studies important applications of computing to medicine, including Hospital Information Systems (HIS), medical imaging, surgery, telemedicine, and pharmacy. **Lec/Lab 3, Credits 3 (Fall)**

MEDI-150**Introduction to Medical Informatics**

An introduction to informatics as applied to the medical field. A study of the nature of medical information and its use in clinical practice, medical research, and medical education. The Electronic Medical Record (EMR) and its impact on health care delivery. The Internet and mobile computing as sources of medical information. The Health Care Information Systems, their development, selection and implementation. The importance of the computing or informatics specialists in medicine and the various roles they can play. Privacy, confidentiality and information security including health care regulatory and accreditation issues and the Health Insurance Portability and Accountability Act (HIPAA). **Lecture 3, Credits 3 (Spring)**

MEDI-245**Medical Informatics Seminar**

This is an introduction to the use of computers in medical practice, education and research. Every week a different speaker from the medical field gives a presentation. Students also receive information concerning career opportunities and cooperative education. **Lecture 1, Credits 1 (Spring)**

MEDI-310 **Developing Medical Applications**
Developing Medical Applications After having successfully completed one semester of computer programming in an object oriented programming language, the students in this course learn new computing systems suitable for developing medical applications. These computing systems are popular in hospitals and other health care facilities for both traditional and web-based database applications. Programming projects are required. (Prerequisites: ISTE-120 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall)**

MEDI-320 **Medical Database Architectures**
This course, designed for BS students with a major or concentration in medical informatics, will provide an in-depth exposure to the design, development, and use of medical databases. Topics may include existing medical databases, flat-file and relational databases, medical data formats, database design and implementation, both relational and object-relational databases, database applications, JDBC, ODBC, SQL, ad hoc queries, desktop and web-based user interfaces, and database administration topics. (Prerequisites: MEDI-310 (4006-310) and ISTE-230 (4002-360) or equivalent courses.) **Lec/Lab 3, Credits 3 (Spring)**

MEDI-330 **The Electronic Health Record**
This course provides an introduction and hands-on practice in both the use and development of electronic health records. Students address issues related to the acquisition, storage, and use of information in computer-based health records including the various types of information used in clinical care: text, structured data, images, audio, video, etc. Other topics covered include: clinical vocabularies (existing schemes and their limitations); how clinical information is generated and utilized; methods of information storage and retrieval; and the legal, social and regulatory problems associated with electronic health records such as security and confidentiality. Programming assignments will be required. (Prerequisites: MEDI-320 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall)**

MEDI-430 **Medical Application Integration**
This course will provide students with an understanding of application integration in health-care. Java programming assignments will be required. Students will also learn medical business processes and how they impact data integration within a hospital. Middleware message brokers will be examined along with the use of the HL7 messaging standard. Web services and other forms of data integration will be studied. (Prerequisites: MEDI-330 and ISTE-121 or equivalent courses.) **Lec/Lab 3, Credits 3 (Spring)**

Networking, Security, and Systems Administration

NSSA-101 **NSA Themes**
This course is an introduction to the fundamentals from each of the primary areas of the networking, security and systems administration (NSSA) domain. Students will develop a collective view of the NSSA field as they experience and integrate the perspectives of the sub-domain areas. Students will carry this perspective into the other supporting coursework of their degree program. Topics will focus on the core concepts in the three areas: 1.) wired and wireless networking; 2.) system and network security and awareness, and 3.) systems administration. Emerging technologies in each of the areas will be explored. A project and case studies will be used as the basis for exploring and interrelating each of the fundamental topics. **Lecture 3, Credits 3 (Fall, Spring)**

NSSA-102 **Computer Systems Concepts**
This course teaches the student the essential technologies needed by NSSA majors, focused on PC and mainframe hardware topics. They include how those platforms operate, how they are configured, and the operation of their major internal components. Also covered are the basic operating system interactions with those platforms, physical security of assets, and computing-centric mathematical concepts. **Lab 2, Credits 3 (Fall, Spring)**

NSSA-102 **Computer Systems Concepts**
This course teaches the student the essential technologies needed by NSSA majors, focused on PC and mainframe hardware topics. They include how those platforms operate, how they are configured, and the operation of their major internal components. Also covered are the basic operating system interactions with those platforms, physical security of assets, and computing-centric mathematical concepts. **Lecture 4, Credits 3 (Fall, Spring)**

NSSA-220 **Task Automation Using Interpretive Languages**
An introduction to the Unix operating system and scripting in the Perl and Unix shell languages. The course will cover basic user-level commands to the Unix operating system, followed by basic control structures, and data structures in Perl. Examples will include GUI programming, and interfacing to an underlying operating system. Following Perl, students will be introduced to the basics of shell programming using the Unix bash shell. Students will need one year of programming in an object-oriented language. (Prerequisite: GCIS-124 or ISTE-121 or ISTE-200 or CSCI-142 or CSCI-140 or CSCI-242 or equivalent course.) **Lecture 4, Credits 3 (Fall, Spring)**

NSSA-221 **Systems Administration I**
This course is designed to give students an understanding of the role of the system administrator in large organizations. This will be accomplished through a discussion of many of the tasks and tools of system administration. Students will participate in both a lecture section and a separate lab section. The technologies discussed in this class include: operating systems, system security, and service deployment strategies. (Prerequisites: NSSA-241 and (NSSA-220 or CSCI-141 or GCIS-123) or equivalent courses.) **Lab 2, Credits 3 (Fall, Spring)**

NSSA-221 **Systems Administration I**
This course is designed to give students an understanding of the role of the system administrator in large organizations. This will be accomplished through a discussion of many of the tasks and tools of system administration. Students will participate in both a lecture section and a separate lab section. The technologies discussed in this class include: operating systems, system security, and service deployment strategies. (Prerequisites: NSSA-241 and (NSSA-220 or CSCI-141 or GCIS-123) or equivalent courses.) **Lecture 4, Credits 3 (Fall, Spring)**

NSSA-241 **Introduction to Routing and Switching**
This course provides an introduction to wired network infrastructures, topologies, technologies, and the protocols required for effective end-to-end communication. Basic security concepts for TCP/IP based technologies are introduced. Networking layers 1, 2, and 3 are examined in-depth using the International Standards Organization's Open Systems Interconnection and TCP/IP models as reference. Course topics focus on the TCP/IP protocol suite, the Ethernet LAN protocol, switching technology, and routed and routing protocols common in TCP/IP networks. The lab assignments mirror the lecture content, providing an experiential learning component for each topic covered. (Prerequisites: NSSA-102 or CSEC-101 or CSEC-140 or NACT-151 or CSCI-250 or equivalent courses.) **Lab 2, Credits 3 (Fall, Spring)**

NSSA-241 **Introduction to Routing and Switching**
This course provides an introduction to wired network infrastructures, topologies, technologies, and the protocols required for effective end-to-end communication. Basic security concepts for TCP/IP based technologies are introduced. Networking layers 1, 2, and 3 are examined in-depth using the International Standards Organization's Open Systems Interconnection and TCP/IP models as reference. Course topics focus on the TCP/IP protocol suite, the Ethernet LAN protocol, switching technology, and routed and routing protocols common in TCP/IP networks. The lab assignments mirror the lecture content, providing an experiential learning component for each topic covered. (Prerequisites: NSSA-102 or CSEC-101 or CSEC-140 or NACT-151 or CSCI-250 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

NSSA-242 **Wireless Networking**
This course is designed to provide the student with an understanding of the protocols, principles and concepts of radio communication as they apply to wireless data networking (802.11) for local area networks and peripherals. As its basis it uses the fundamental concepts and technologies learned in Introduction to Routing and Switching, and expands upon them to include other contemporary and emerging technologies. Topics including WLANs, wireless network operation, network integration, construction and network design will be discussed. Modulation techniques, measurement standards, nomenclature, equipment and theory behind transmissions in this portion of the electromagnetic spectrum will be examined. (Prerequisites: NSSA-241 or equivalent course.) **Lab 2, Credits 3 (Fall, Spring)**

NSSA-242 **Wireless Networking**
This course is designed to provide the student with an understanding of the protocols, principles and concepts of radio communication as they apply to wireless data networking (802.11) for local area networks and peripherals. As its basis it uses the fundamental concepts and technologies learned in Introduction to Routing and Switching, and expands upon them to include other contemporary and emerging technologies. Topics including WLANs, wireless network operation, network integration, construction and network design will be discussed. Modulation techniques, measurement standards, nomenclature, equipment and theory behind transmissions in this portion of the electromagnetic spectrum will be examined. (Prerequisites: NSSA-241 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

NSSA-244 **Virtualization**
This class will take the students through the evolution of virtualization. The class begins with virtual network topologies such as VLANs, trunks and virtual routing and forwarding. The class will examine the various desktop virtualization platforms (Type 1) such as VirtualBox and VMware workstation. Midway through the class students will transition into bare metal hypervisors (Type 2) and server virtualization. Elements of software defined networking, storage (ex. iSCSI) and cloud computing will also be discussed. (Prerequisites: NSSA-221 and NSSA-241 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

NSSA-245**Network Services**

This course will investigate the protocols used to support network based services and the tasks involved in configuring and administering those services in virtualized Linux and Windows internet working environments. Topics include an overview of the TCP/IP protocol suite, in-depth discussions of the transport layer protocols, TCP and UDP, administration of network based services including the Dynamic Host Configuration Protocol (DHCP), Domain Name Service (DNS), Secure Shell (SSH), and Voice Over IP (VoIP). Students completing this course will have thorough theoretical knowledge of the Internet Protocol (IP), the Transport Control Protocol (TCP), and the User Datagram Protocol (UDP), as well as experience in administering, monitoring, securing and troubleshooting an internet work of computer systems running these protocols and services. (Prerequisites: NSSA-241 and (NSSA-220 or CSCI-141 or GCIS-123) and NSSA-221 or equivalent courses.) **Lab 4, Credits 3 (Fall, Spring)**

NSSA-245**Network Services**

This course will investigate the protocols used to support network based services and the tasks involved in configuring and administering those services in virtualized Linux and Windows internet working environments. Topics include an overview of the TCP/IP protocol suite, in-depth discussions of the transport layer protocols, TCP and UDP, administration of network based services including the Dynamic Host Configuration Protocol (DHCP), Domain Name Service (DNS), Secure Shell (SSH), and Voice Over IP (VoIP). Students completing this course will have thorough theoretical knowledge of the Internet Protocol (IP), the Transport Control Protocol (TCP), and the User Datagram Protocol (UDP), as well as experience in administering, monitoring, securing and troubleshooting an internet work of computer systems running these protocols and services. (Prerequisites: NSSA-241 and (NSSA-220 or CSCI-141 or GCIS-123) and NSSA-221 or equivalent courses.) **Lecture 4, Credits 3 (Fall, Spring)**

NSSA-290**Networking Essentials for Developers**

This is a course in the basics of network communication for software developers. Topics will include the OSI 7-layer model and its realization in the TCP/IP protocol stack. Students will also learn about naming and name resolution as it is used in the internet, plus the basics of routing and switching. The focus in all of this will be on an analysis of how name resolution, routing and switching operate at the developer's perspective. The specifics of how the socket transport layer appears to the programmer and operates will be a key topic. Finally, an overview of authentication mechanisms and number of examples of the security vulnerabilities of existing communication protocols will be provided to instruct students on the inherent risks of communication via the INTERNET. (Prerequisites: GCIS-124 or ISTE-121 or ISTE-200 or CSCI-142 or CSCI-140 or CSCI-242 or IGME-102 or IGME-106 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

NSSA-320**Configuration Management**

This course teaches students advanced techniques in the Perl language. Techniques include the use and construction of object oriented scripts, user administration and monitoring, file system walking and checking, and computer and network security issues. (Prerequisites: NSSA-220 or CSCI-141 or GCIS-123 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall)**

NSSA-322**Systems Administration II**

This course will explore the skills required of a systems administrator in a large enterprise organization. Students will gain experience in managing an integrated Linux and Windows environment, using identity management, monitoring, and centralized logging systems. Other areas of examination will include a deeper understanding of many protocols including DNS, DHCP, SNMP, LDAP, IMAP, and SMTP. Containerization and virtualization concepts will also be explored. The student will also study security topics including Transport Layer Security, Pluggable Authentication Modules, SELinux, Kerberos, and Group Policy Objects. This course is a writing-intensive course that will require students to write a formal research paper. (Prerequisites: NSSA-221 or equivalent course.) **Lab 2, Credits 3 (Fall, Spring)**

NSSA-322**Systems Administration II**

This course will explore the skills required of a systems administrator in a large enterprise organization. Students will gain experience in managing an integrated Linux and Windows environment, using identity management, monitoring, and centralized logging systems. Other areas of examination will include a deeper understanding of many protocols including DNS, DHCP, SNMP, LDAP, IMAP, and SMTP. Containerization and virtualization concepts will also be explored. The student will also study security topics including Transport Layer Security, Pluggable Authentication Modules, SELinux, Kerberos, and Group Policy Objects. This course is a writing-intensive course that will require students to write a formal research paper. (Prerequisites: NSSA-221 or equivalent course.) **Lecture 4, Credits 3 (Fall, Spring)**

NSSA-341**VoIPandUnifiedCommunications**

Students will explore the issues associated with migrating to newer systems and implement their own IP based voice networks. These networks will be designed to carry real time data, including IP telephony and video. Topics will include codecs, protocols and the changing nature of the industry. (Prerequisites: NSSA-242 or equivalent course.) **Lab 4, Credits 3 (Fall)**

NSSA-341**VoIPandUnifiedCommunications**

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NSSA-342**Large Scale Networking**

This course will discuss the changing nature of communication, the requirements of emerging applications, the effect on network design, quality of service and the associated security concerns. The focus is on the evolution of multimedia services (such as voice and video) and Internetworking technologies in support convergence. This course will focus on advanced networking techniques to ensure quality of service and security for real time data. Examples include policies and class based routing. (Prerequisites: NSSA-245 or equivalent course.) **Lab 2, Credits 3 (Spring)**

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NSSA-370**Project Management**

This course teaches students essential project management principles and prepares them to be effective members of a project team. Topics include business drivers for project selection, project management methodologies, and practical implementation of project management principles across the Information Technology spectrum. (This class is restricted to students with at least 3rd year standing.) **Lecture 3, Credits 3 (Spring)**

NSSA-422**Storage Architectures**

This course provides students with a theoretical as well as hands-on exposure to enterprise scale storage technologies such as storage area networks and network attached storage. Students will study SCSI, Fibre Chanel, IP Storage, Infiniband, and Fibre Channel over Ethernet both in lectures and labs. They will also gain a better appreciation for the importance of storage architectures in the enterprise. (Prerequisites: NSSA-322 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

NSSA-423**Scalable Computing Architectures**

This course explores mid-range (server farms and clusters) and mainframe system architecture, hardware, configuration, and operating system concepts. Students in this course gain understanding of the reasons companies choose mid-range and large-scale systems for their computing environments and how those firms implement those architectures. (Prerequisites: GCIS-124 or ISTE-121 or ISTE-200 or CSCI-142 or CSCI-140 or CSCI-242 or IGME-102 or IGME-106 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

NSSA-425**Data Center Operations**

This course provides students with a background in the technologies and techniques used to design, implement, and maintain a modern data center. This course will help students to see the interrelated nature of many of these topics and to gain a better understanding of the role of the following technologies in a modern data center: physical facility design, network infrastructures, power distribution, heating, ventilation and air conditioning (HVAC), storage, high-availability computing, disaster recovery, and emerging data center technologies. (Prerequisites: NSSA-322 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

NSSA-426**System Design and Deployment**

Problems or the implementation of a new business strategy requiring the support of computing solutions for their resolution or success must first be systematically analyzed to determine the most effective and cost efficient solution. Once the solution is defined and designed it must then be successfully deployed. This course will help students develop skills in the areas of requirements gathering, requirements analysis and group problem solving. Using prerequisite knowledge students will design a solution. Students will learn the about the consequences of new technology solutions and how to plan a successful deployment and implementation of their technological solution. (Prerequisites: NSSA-322 or equivalent course and 4th year standing.) **Lecture 3, Credits 3 (Fall, Spring)**

NSSA-427 Scalable Web Services Architectures
Web applications can be highly variable in both their workload and the amount of resources required to support their provision of services to users. Having access to cloud based resources allows organizations to actively manage service deployment in different ways and with different tools. This course will enable students to utilize and develop cloud-based implementations of tools, such as load balancing and distributed systems architectures, and identify the challenges associated with the provision of services in this environment and some of the cloud-based tools and techniques used to manage service deployment. Projects will be required. (Prerequisites: (NSSA-241 and NSSA-320) or (NSSA-290 and ISTE-444) or equivalent course.) **Lec/Lab 3, Credits 3 (Spring)**

NSSA-441 Advanced Routing and Switching
Advanced Routing and Switching covers advanced networking technologies available to enterprises. Protocol options and their evolutions over the years, the growth in complexity and its impacts are explored in depth. Topics include: VLANs and VLAN Hierarchies, Loop-Avoidance in customer, provider and provider backbone networks such as RSTP and Shortest Path Bridging, IPv4 and IPv6 coexistence issues, Routing protocols with IPv4 and IPv6 for inter and intra-AS routing, MobileIP, queuing and Quality of service routing and congestion control in the Internet, MultiProtocol Label Switching, Routing and Switching in wireless networks (Prerequisites: NSSA-241 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

NSSA-443 Network Design and Performance
This course will examine the design and performance of networks. Students will learn to design networks based on identified needs and analyze the performance of that network. The designs include site, campus, and enterprise. WAN technologies will be combined with LAN technologies in the design of enterprise networks. A simulation tool may be used to implement the design as a network model and evaluate the performance of the network model. (Prerequisites: NSSA-241 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

NSSA-445 Mobile Adhoc and Sensor Networks
This course will help students to identify the major challenges in deploying mobile adhoc and sensor networks. Students will explore current ad-hoc/sensor technologies by researching key areas such as algorithms, protocols and applications. Students will learn to investigate how some of the challenges are addressed by researching publications. At the end of this course students will gain knowledge on the latest technological advances in wireless ad hoc and sensor networks, their significance in multiple applications and solutions to challenges that still require to be addressed. (Prerequisites: NSSA-242 and ISTE-101 or ISTE-121 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

Software Engineering

SWEN-099 Undergraduate Cooperative Education Seminar
This seminar helps students prepare for Software Engineering co-operative education employment ("co-op") by developing job search strategies and materials, and reviewing relevant policies. Students are introduced to RIT's Office of Career Services and Cooperative Education, and learn about professional and ethical responsibilities for their co-op and subsequent professional experiences. Completion of this seminar and the related assignments are required before a SE student can be registered for co-op. (Prerequisites: This class is restricted to SOFTENG-BS or COMPEX-UND Major students with at least 2nd year standing.) **Lecture 1, Credits 0 (Fall, Spring)**

SWEN-101 Software Engineering Freshman Seminar
Provides first-year students with the skills necessary to succeed at RIT and in the software engineering program. Small group sessions are used to help new students make friends, create a stronger bond with RIT and their program and become acquainted with the campus and its facilities. In addition, students are introduced to the profession of software engineering and to ethical issues they will face at RIT and throughout their careers. (SOFTENG-BS) **Lecture 2, Credits 1 (Fall)**

SWEN-102 Software Engineering Seminar for Transfers
Provides students that have recently transferred into the software engineering program with an introduction to the profession of software engineering and the skills necessary to succeed in the program. (SOFTENG-BS) **Lecture 2, Credits 1 (Fall, Spring)**

SWEN-123 Software Development and Problem Solving I
A first course introducing students to the fundamentals of computational problem solving. Students will learn a systematic approach to problem solving, including how to frame a problem in computational terms, how to decompose larger problems into smaller components, how to implement innovative software solutions using a contemporary programming language, how to critically debug their solutions, and how to assess the adequacy of the software solution. Additional topics include an introduction to object-oriented programming and data structures such as arrays and stacks. Students will complete both in-class and out-of-class assignments. **Lab 6, Credits 4 (Fall, Spring)**

SWEN-124 Software Development and Problem Solving II
A second course that delves further into computational problem solving, now with a focus on an object-oriented perspective. There is a continued emphasis on basic software design, testing & verification, and incremental development. Key topics include theoretical abstractions such as classes, objects, encapsulation, inheritance, interfaces, polymorphism, software design comprising multiple classes with UML, data structures (e.g. lists, trees, sets, maps, and graphs), exception/error handling, I/O including files and networking, concurrency, and graphical user interfaces. Additional topics include basic software design principles (coupling, cohesion, information expert, open-closed principle, etc.), test driven development, design patterns, data integrity, and data security. (Prerequisite: C- or better in SWEN-123 or CSEC-123 or GCIS-123 or equivalent course.) **Lab 6, Credits 4 (Fall, Spring, Summer)**

SWEN-220 Mathematical Models of Software
An introduction to the use of mathematics to model software as part of the software process. Included will be models of software structure and functionality, concurrent and distributed computation, and structured data. (Prerequisites: (MATH-190 or MATH-131) and (CSCI-140, CSCI-142 or CSCI-242) or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

SWEN-250 Personal Software Engineering
This is a project-based course to enhance individual, technical engineering knowledge and skills as preparation for upper-division team-based coursework. Topics include adapting to new languages, tools and technologies; developing and analyzing models as a prelude to implementation; software construction concepts (proper documentation, implementing to standards etc.); unit and integration testing; component-level estimation; and software engineering professionalism. (Pre-requisites: CSCI-105 or CSCI-141 or SWEN-123 or CSEC-123 or GCIS-123 (all with a C- or better) or equivalent course. Co-requisites: CSCI-140 or CSCI-142 or CSCI-242 or SWEN-124 or CSEC-124 or GCIS-124 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

SWEN-256 Software Process and Project Management
An introductory course to software process and related software project management issues. Emphasis is on the study, use, evaluation, and improvement of the software development process and related project management. Topics include software development methodologies, software project planning and tracking, change control, software quality assurance, risk management, and software process assessment and improvement. (Prerequisites: SWEN-261 or equivalent course) **Lecture 3, Credits 3 (Fall, Spring)**

SWEN-261 Introduction to Software Engineering
An introductory course in software engineering, emphasizing the organizational aspects of software development and software design and implementation by individuals and small teams within a process/product framework. Topics include the software lifecycle, software design, user interface issues, specification and implementation of components, assessing design quality, design reviews and code inspections, software testing, basic support tools, technical communications and system documentation, team-based development. A term-long, team-based project done in a studio format is used to reinforce concepts presented in class. (Prerequisite: CSCI-140 or CSCI-142 or CSCI-242 or SWEN-124 or CSEC-124 or GCIS-124 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

SWEN-262 Engineering of Software Subsystems
An introduction to the principles of the foundations of contemporary software design. Topics include software subsystem modeling, design patterns, design tradeoffs, and component-based software development, with a focus on application of these concepts to concrete design problems. The relationship between design and related process issues such as testing, estimation, and maintenance are also discussed. (Prerequisites: SWEN-261 and (SWEN-250 or (CSCI-243 or 4003-334) or CMPE-380 or SOFTENG-MN) or equivalent courses.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

SWEN-331 Engineering Secure Software
Principles and practices forming the foundation for developing secure software systems. Coverage ranges across the entire development lifecycle: requirements, design, implementation and testing. Emphasis is on practices and patterns that reduce or eliminate security breaches in software intensive systems, and on testing systems to expose security weaknesses. (Prerequisites: SWEN-261 and (SWEN-488 or SWEN-498 or SWEN-499 or CSEC-499 or CSCI-488 or CSCI-499 or CMPE-499) or equivalent course.) **Studio 3, Credits 3 (Fall, Spring)**

SWEN-340 Software Design for Computing Systems
To design and develop high quality products software engineers need to understand the physical components and systems that are an integral part of these products. This understanding is critical in the fulfillment of non-functional requirements such as performance, reliability and security. This course will provide software engineering students with hardware, computer architecture, and networking domain specific knowledge. Course programming assignments will provide practical experience developing software that interfaces with hardware components and systems. Credit cannot be granted for this course and CMPE-240. (Prerequisites: SWEN-250 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

SWEN-342 Engineering of Concurrent and Distributed Software Systems
The principles, practices and patterns applicable to the design and construction of concurrent and distributed software systems. Topics include synchronization, coordination and communication; deadlock, safety and liveness; concurrent and distributed design patterns; analysis of performance; distributed state management. (Prerequisites: SWEN-262 and (SWEN-220 or SWEN-344) or equivalent courses.) **Studio 3, Credits 3 (Fall, Spring)**

SWEN-343 Engineering of Enterprise Software Systems
This course addresses architecture-level design of large, enterprise-critical software systems. The course focuses on enterprise-level design patterns and on design approaches for object-oriented and aspect-oriented application containers: encapsulating database access, application distribution, concurrent session management, security, scalability, reliability, web-based user interaction, and the programming models and tools to support system development, integration, testing, and deployment. Hands-on exercises and a team project will reinforce the course concepts and expose students to the complexity of these systems. (Prerequisites: SWEN-262 and (SWEN-220 or SWEN-344) or equivalent courses.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

SWEN-344 Engineering of Web Based Software Systems
A course in web engineering, emphasizing organizational aspects of web development, design and implementation by individuals and small teams. Students will be instructed in the proper application of software engineering principles to the creation of web applications. Course topics will include, but not be limited to web usability, accessibility, testing, web services, databases, requirements elicitation and negotiation. A term-long, team-based project done in a studio format is used to reinforce concepts presented in class. (Prerequisite: CSCI-140 or CSCI-142 or CSCI-242 or SWEN-124 or CSEC-124 or GCIS-124 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

SWEN-350 Software Process and Product Quality
This course covers advanced topics in software engineering relating to software quality, with processes and metrics being viewed as a means to achieving quality. Quality is interpreted broadly to include product functionality and performance, project schedule and budget, and business objectives. Software metrics help a software organization on two main fronts: quality assessment of its products and processes, and process improvement towards its main goal: the production of successful software artifacts within schedule and budget constraints. (Prerequisites: SWEN-256 and (STAT-205 or STAT-145 or MATH-251) and (SWEN-488 or SWEN-498 or SWEN-499 or CSCI-499 or CSCI-488 or CSEC-499 or CMPE-499) or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

SWEN-352 Software Testing
Concepts and techniques for testing software and assuring its quality. Topics cover software testing at the unit and system levels; static vs. dynamic analysis; functional testing; inspections; and reliability assessment. (Prerequisites: SWEN-261 or equivalent course) **Lecture 3, Credits 3 (Fall, Spring)**

SWEN-356 Trends in Software Development Processes
A course in the exploration of current approaches in planning, executing and managing the project activities performed during the development of a professional software product. Topics include the characteristics of state of the practice development methods, selecting practices best suited based on project context and techniques for refining practices to achieve process improvement. Students work on team projects inclusive of all development life cycle activities to reinforce concepts presented in class. (Prerequisites: SWEN-256 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

SWEN-383 Software Design Principles and Patterns
Quality software designs and architectures reflect software engineering principles that represent best contemporary practice. This course focuses on explicating these fundamental principles, examining a set of design and architecture patterns that embody the principles, and applying patterns appropriate to a design problem in a given context. Restricted to IST majors only. (Prerequisites: ISTE-240 or equivalent course.Co-requisite: ISTE-340 or equivalent course.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

SWEN-440 Software System Requirements and Architecture
Principles and practices related to identifying software system stakeholders, eliciting functional and quality requirements, translating requirements into architectural structures, and analyzing candidate architectures with respect to the requirements. (Prerequisites: SWEN-488 or SWEN-498 or SWEN-499 or CSCI-499 or CSCI-488 or CMPE-499 or CSEC-499 or equivalent courses.Co-requisites: SWEN-444 or SWEN-445 or equivalent course.) **Studio 3, Credits 3 (Fall, Spring)**

SWEN-444 Human-Centered Requirements and Design
This course introduces quantitative models and techniques of human-computer interface analysis, design and evaluation, which are relevant to the software engineering approach of software development. User-focused requirements engineering topics are also covered. Contemporary human computer interaction (HCI) techniques are surveyed, with a focus on when and where they are applicable in the software development process. Students will deliver usable software systems derived from an engineering approach to the application of scientific theory and modeling. Other topics may include usability evaluation design, methods of evaluation, data analysis, social and ethical impacts of usability, prototyping and tools. (Prerequisites: SWEN-262 or equivalent courses.Co-requisites: STAT-205 or STAT-145 or MATH-251 or equivalent courses.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

SWEN-445 Honors Human Centered Requirements and Design
This course introduces quantitative models and techniques of human-computer interface analysis, design and evaluation, which are relevant to the software engineering approach of software development. User-focused requirements engineering topics are also covered. Contemporary human computer interaction (HCI) techniques are surveyed, with a focus on when and where they are applicable in the software development process. Students will deliver usable software systems derived from an engineering approach to the application of scientific theory and modeling. Other topics may include: usability evaluation design, methods of evaluation, data analysis, social and ethical impacts of usability, prototyping and tools. (Prerequisites: SWEN-262 or equivalent courses.Co-requisites: STAT-205 or STAT-145 or MATH-251 or equivalent courses.) **Lecture 3, Credits 3 (Fall or Spring)**

SWEN-488 SoftwareEngineeringSummerCoop
Software Engineering cooperative work block. One summer block of appropriate paid work experience in industry. (Prerequisites: SWEN-262 with a grade of C- or better and COMM-253 and SWEN-99 or equivalent courses.) **CO OP, Credits 0 (Summer)**

SWEN-498 Software Engineering CIR Experience
This course may be taken in lieu of one of the four cooperative education blocks to provide experience in non-traditional venues for creativity, innovation and research. Registration conditional on submitted plan of activity and approval of Department of Software Engineering. **CO OP, Credits 0 (Summer)**

SWEN-499 Software Engineering Co-op
Software Engineering cooperative work block. One semester of appropriate paid work experience in industry. (Prerequisites: SWEN-262 with a grade of C- or better and COMM-253 and SWEN-99 or equivalent courses.) **CO OP, Credits 0 (Fall, Spring)**

SWEN-514 Engineering Cloud Software Systems
The course focuses on designing and implementing applications using cloud software systems infrastructure and technologies. The course introduces the basic concepts and knowledge on cloud computing systems and application infrastructure. It also briefly introduces key technologies and paradigms related to developing big data applications in the cloud. The course contains a set of related topics which are covered via hands-on class instruction, application development in teams, course materials, and class discussions. Programming projects and demo presentations are required. (Prerequisites: SWEN-262 and (SWEN-220 or SWEN-344) or equivalent courses.) **Lec/Lab 3, Credits 3 (Fall)**

SWEN-548 SE Affinity Research Group
This course is a project-based, research-focused course that supports teamwork, collaboration, and both professional and technical skill building. Students will work in teams that consist of both students and professor. Topics include: research methods, technical communication, and technical topics that are relevant to the project(s). (Prerequisites: SWEN-261 or equivalent course) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

SWEN-549 Software Engineering Design Seminar
Emerging topics of relevance in software engineering design. (Prerequisites: SWEN-262 and (SWEN-220 or SWEN-344) or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

SWEN-559 Software Engineering Process Seminar
Emerging topics of relevance in software engineering process. (Prerequisites: SWEN-256 or equivalent course.) **Lecture, Credits 1 - 3 (Fall, Spring)**

SWEN-561 Software Engineering Project I
The first course in a two-course, senior-level, capstone project experience. Students work as part of a team to develop solutions to problems posed by either internal or external customers. Problems may require considerable software development or evolution and maintenance of existing software products. Culminates with the completion and presentation of the first major increment of the project solution. Students must have co-op completed to enroll. (Prerequisites: Co-op requirement completed - (2 completions SWEN-499) and 1 completion of SWEN-488 or SWEN-498) and SWEN-256 and (SWEN-444 or SWEN-445) or equivalent courses and students in SOFTENG-BS Major. Co-requisites: SWEN-440 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

SWEN-562

Software Engineering Project II

This is the second course in a two-course, senior-level capstone project experience. Students submit one or more additional increments that build upon the solution submitted at the end of the first course. Students make major presentations for both customers as well as technical-oriented audiences, turn over a complete portfolio of project-related artifacts and offer an evaluation of the project and team experience. (Prerequisites: SWEN-561 or equivalent course.)

Lecture 3, Credits 3 (Fall, Spring)

SWEN-563

Real-Time and Embedded Systems

This course provides a general introduction to real-time and embedded systems. It will introduce a representative family of microcontrollers and require students to program on these devices. Fundamental material on real-time operating systems, such as requirements specification, scheduling algorithms and priority inversion avoidance will be presented. The features of a commercial real-time operating system will be discussed and used for course projects. (Prerequisites: SWEN-340 or CMPE-240 or CSCI-251 or CMPE-380 or ((CPET-201 and CPET-202) or 0618-303) or equivalent course.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

SWEN-564

Modeling of Real-Time Systems

This course introduces the modeling of real-time software systems. It takes an engineering approach to the design of these systems by analyzing system models before beginning implementation. UML will be the primary modeling methodology. Non-UML methodologies will also be discussed. Implementations of real-time systems will be developed manually from the models and using automated tools to generate the code. (Prerequisites: CMPE-240 or CSCI-251 or CMPE-380 or SWEN-340 or equivalent course.) **Lec/Lab 3, Credits 3 (Spring)**

SWEN-565

Performance Engineering of Real-Time and Embedded Systems

This course discusses issues of performance in real-time and embedded systems. Techniques for profiling the resource usage of a system and for measuring the effect of increasing system requirements will be covered. The control of physical systems will motivate the need for performance tuning of a real-time system. Students will write programs running under a real-time operating system that can maintain control of a physical system. The course will discuss and experiment with performance trade-offs that can be made using hardware-software co-design. (Prerequisites: CMPE-240 or CSCI-251 or CMPE-380 or SWEN-340 or equivalent course.)

Lecture 3, Credits 3 (Fall)

SWEN-567

Hardware/Software Co-Design for Cryptographic Applications

The objective of this course is to establish knowledge and skills necessary for efficient implementations of cryptographic primitives on reconfigurable hardware. Implementation platform will be a field programmable gate array (FPGAs) containing general purpose processor and additional reconfigurable fabric for implementations of custom hardware accelerators. In the studio format students work on team projects that require them to design, and then compare and contrast software, custom FPGA hardware, and hybrid hardware-software co-design implementations of selected cryptographic primitives. (Prerequisite: SWEN-261 and CSCI-462 or equivalent courses.) **Studio 3, Credits 3 (Spring)**

SWEN-590

Software Engineering Seminar

Emerging topics of relevance in software engineering. **Lecture, Credits 1 - 3 (Fall, Spring)**

SWEN-598

Honors Independent Study

The honors student will work independently under the supervision of a faculty adviser on a topic not covered in other courses. (Enrollment in this course requires permission from the department offering the course.) **Lecture, Credits 1 - 3 (Fall, Spring)**

SWEN-599

Independent Study

The student will work independently under the supervision of a faculty adviser on a topic not covered in other courses (proposal signed by a faculty member) (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 3 (Fall, Spring)**

GCCIS College Level Courses

GCIS-115

Programming Problem Solving Workshop

This course provides supplemental instruction and practice with fundamental computational problem solving concepts. The course is intended for students who have previously completed GCIS-123, but feel that additional practice and instruction will reinforce the material. (Prerequisite: C- or better in GCIS-123 or equivalent course.) **Lab 6, Credits 2 (Spring)**

GCIS-120

Computational Thinking and Problem Solving

This is a second course that delves further into computational thinking and problem solving, now with a focus on an object-oriented theories and models. Computational thinking involves the thought processes involved in understanding problems and solutions that can be represented as computational steps and algorithms. Computational thinking underlies all theory and application within computing but is found in other domains as well. Computational thinking includes core ideas such as variables, conditional logic, and iteration, along with abstraction, decomposition, and object-oriented thinking. Computational thinking may be done alone or in teams. There is a continued emphasis on basic algorithmic design, abstraction, critical thinking, and incremental development. Key topics include theoretical abstractions such as classes, objects, encapsulation, inheritance, interfaces, polymorphism, and data structures (e.g. lists, trees, sets, maps, and graphs). (Prerequisite: GCIS-123 or equivalent course.) **Lecture 6, Credits 4 (Spring)**

GCIS-123

Software Development and Problem Solving I

A first course introducing students to the fundamentals of computational problem solving. Students will learn a systematic approach to problem solving, including how to frame a problem in computational terms, how to decompose larger problems into smaller components, how to implement innovative software solutions using a contemporary programming language, how to critically debug their solutions, and how to assess the adequacy of the software solution. Additional topics include an introduction to object-oriented programming and data structures such as arrays and stacks. Students will complete both in-class and out-of-class assignments. **Lab 6, Credits 4 (Fall, Spring)**

GCIS-124

Software Development and Problem Solving II

A second course that delves further into computational problem solving, now with a focus on an object-oriented perspective. There is a continued emphasis on basic software design, testing & verification, and incremental development. Key topics include theoretical abstractions such as classes, objects, encapsulation, inheritance, interfaces, polymorphism, software design comprising multiple classes with UML, data structures (e.g. lists, trees, sets, maps, and graphs), exception/error handling, I/O including files and networking, concurrency, and graphical user interfaces. Additional topics include basic software design principles (coupling, cohesion, information expert, open-closed principle, etc.), test driven development, design patterns, data integrity, and data security. (Prerequisite: C- or better in SWEN-123 or CSEC-123 or GCIS-123 or equivalent course.) **Lab 6, Credits 4 (Fall, Spring, Summer)**

GCIS-125

Software Development and Problem Solving II Seminar

This course is the conclusion of the GCIS-120 that delves further into computational problem solving, now with a focus on an object-oriented perspective. There is a continued emphasis on basic software design, testing & verification, and incremental development. Key topics include theoretical abstractions such as polymorphism, software design comprising multiple classes with UML, data structures (e.g. lists, trees, sets, maps, and graphs), exception/error handling, I/O including files and networking, concurrency, and graphical user interfaces. Additional topics include basic software design principles (coupling, cohesion, information expert, open-closed principle, etc.), test driven development, design patterns, data integrity, and data security. (Prerequisite: C- or better in GCIS-120 or equivalent course.) **Lecture 6, Credits 0 (Summer)**

Kate Gleason College of Engineering

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Course numbering: RIT courses are generally referred to by their alphanumeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100-299), upper division (300-599), or graduate level (600 and above).

Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.

Biomedical Engineering

BIME-099

BME Career Seminar

The "BME Careers" seminar series helps students learn more about the field through the experiences of other students, faculty, alumni, and working engineers. The series provides resources that will help them succeed at RIT and in the work force. Questions such as "What can I do as a BME?" and "How does your company use BMEs?" are complicated. Rather than explore these questions in a single session, we're using this seminar series to help students explore these questions over the course of the year. (Prerequisites: EGEN-99 or equivalent course.) **Lecture 1, Credits 0 (Spring)**

BIME-181

Intro to Biomedical Engineering

This course will provide an overview of the discipline. It will consist of the following components: 1) Overview of the discipline. 2) Introduction of an engineering design methodology applicable to biomedical problems. 3) Opportunity to address a simple biomedical engineering-related problem that requires formulating a problem statement, conducting research, proposing a solution, preparing a summary report, and presenting results. 4) Introduction to team dynamics, organization and interpersonal communication associated with working with a multidisciplinary team. (This course is restricted to BIME-BS Major students.) **Lab 2, Credits 1 (Fall)**

BIME-181

Intro to Biomedical Engineering

This course will provide an overview of the discipline. It will consist of the following components: 1) Overview of the discipline. 2) Introduction of an engineering design methodology applicable to biomedical problems. 3) Opportunity to address a simple biomedical engineering-related problem that requires formulating a problem statement, conducting research, proposing a solution, preparing a summary report, and presenting results. 4) Introduction to team dynamics, organization and interpersonal communication associated with working with a multidisciplinary team. (This course is restricted to BIME-BS Major students.) **Lecture 1, Credits 1 (Fall)**

BIME-182

Intro to Programming for Biomedical Engineering

Builds on the overview of the field of biomedical engineering presented in BIME-181 course with the following additional components: 1) Introduction to programming as an organized, problem solving method (MATLAB and LabVIEW or equivalent). 2) Application of programming for the purpose of removing artifacts from measured signals and analysis of signal properties including their statistical properties. 3) Addressing a simple biomedical engineering related problem that requires and necessitates a problem statement, research, solution proposal, data acquisition and processing, data analysis, and summary report and presentation of results (Prerequisites: BIME-181 or EGEN-100 or equivalent course.) **Lecture 3, Credits 2 (Spring)**

BIME-191

Introduction to Programming for Biomedical Engineers

This course introduces basic computational problem solving techniques used in engineering. Topics include: 1) Use of common engineering tools (Excel, Matlab) to analyze data, 2) Development of algorithms and flowcharts to solve engineering problems, 3) Application of basic programming concepts (input/output methods, variable types, repetition structures, decision structures, and subprograms) to create user-friendly computer programs (VBA, Matlab) that perform complex engineering calculations. (Prerequisites: BIME-181 or EGEN-100 or equivalent course.) **Lec/Lab 4, Credits 3 (Spring)**

BIME-200

Introductory Musculoskeletal Biomechanics

This course is an introduction to engineering mechanics in the context of biomechanics. The course is designed to provide students with an understanding of how the musculoskeletal system reacts to various mechanical forces applied to it in both static and dynamic conditions. Sporting examples are used to illustrate how classical Newtonian mechanics is applied in human locomotion externally, in interactions with the environment. The course describes how basics of kinetics and kinematics are used to analyze the mechanics of human movement and inanimate objects. The main areas addressed are static equilibrium, mechanical stability, linear and angular kinematics, motion with constant and non-constant acceleration, collision and conservation of momentum, work, energy, and power. The course develops an awareness and appreciation of both qualitative and quantitative data collection methods within the field of biomechanics. In addition to rigid body mechanics, the course also introduces students to the concepts of stress and strain and how they affect muscle tissue and bones. Mechanical properties such as stiffness, strength, toughness, and fatigue resistance are considered in the context of bone structures and loading. (Prerequisites: PHYS-211 or PHYS-211A or 1017-312 or 1017-312T or 1017-389 or PHYS-206 and PHYS-207 or equivalent course and student standing in the BIME-BS or ENGRX-UND program.) **Lecture 3, Credits 3 (Fall)**

BIME-250

Biosystems Process Analysis

A first course for biomedical engineers introducing units, physical properties, dimensions, dimensional analysis, data analysis and data presentation for engineering, stoichiometry of biological reactions, simple material and energy balances for batch and continuous systems in steady and unsteady states. This course provides the students with the essential skills required to analyze biosystems, and special focus is given to developing problem solving skills with a biological context. (Prerequisite: MATH-182 and CHMG-142 or equivalent course or student standing in the BIME-BS or ENGRX-UND program. Co-requisite: BIOG-140 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

BIME-320

Fluid Mechanics

This course exposes students to the fundamentals of static and flowing fluids at both large-scale (control volumes) and local differential scales. Student learn how to examine forces on solids due to static and flowing fluids, estimate head losses and pumping requirements in piping systems. The art of engineering approximation is examined through estimates of forces due to flow on solids, as well as limiting cases involving internal pipe flows with friction factors. Exact solutions of local differential equations of fluid mechanics are considered under both steady state and transient conditions, and these analyses are used to determine forces in control volume analysis of bodies. The important interplay between differential and control volume analyses in solving problems is emphasized. Lastly, students are taught to make analogies about the concepts learned in generic fluid mechanics and apply them to the circulatory system, while outlining appropriate limitations. (Prerequisites: (PHYS-206 or PHYS-211) and (MATH-221 or MATH-231) or equivalent courses. Co-requisite: MATH-221 or MATH-231 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

BIME-340

3D-Technologies for Prosthetic Applications

3D-technologies offer exciting potential to address the needs of individuals with amputations across the globe. Developing solutions to complex real-world problems requires the cooperative expertise of several disciplines. Students will get hands-on experience with 3D-printers, scanners and software, and discover strategies for applying their academic skills within an interdisciplinary environment. Person-centered design, medical device policy, mechanical properties of materials and life cycle analyses will be examined. Physiological challenges of fitting devices that interface with the body and the benefits and dangers of open-source designs will be explored. Critical thinking will be applied to determine what makes a prosthetic "better" or "worse" within complex environmental and cultural contexts. Psychological ramifications of limb loss and wearing prosthetics will be considered. At what point does it cease to be a device and begin to become a part of the individual? (A minimum of 3rd year standing is required to enroll.) **Lec/Lab 3, Credits 3 (Spring)**

BIME-345

Learning

Neuroscience Principles and Methods through Facts and Fiction of the Movies

In this course, we will fuse together the fact and fiction of movies with neuroscience. One type of assignments in the course will involve watching a set of movies (e.g.: Inception, Black Mirror, Eternal Sunshine of the Spotless Mind, Fringe, Memento) and then connecting the ideas presented in the movie with what we will cover in class, which will focus on neuroscience and the methods that are used to study it. Papers that have played a crucial role in advancing neuroscience research and innovation will be discussed in tandem with the movies. Students will be able to identify and analyze the premise that underlies these movies as a whole: the neuroscience tenet that "the brain is the mind's physical substrate through which ideas, memories, and personalities can be artificially enhanced or distorted". Ethical considerations of developing neuronal clusters "in a dish" will also be considered. (Prerequisites: PHYS-211 and PHYS-212 and BIME-200 or equivalent courses. Co-requisites: BIOG-141) **Lecture 3, Credits 3 (Spring)**

BIME-346 Imaging the Human Brain in vivo with MRI: a theoretical and hands-on approach

This course will introduce students to tools and concepts of human brain imaging in vivo. The course has a lecture and a lab component. Lectures will cover the fundamental principles of neuroscience, including brain anatomy and physiology, and neuroimaging techniques, with a focus on Magnetic Resonance Imaging (MRI). During lab sessions, students will use a 3 Tesla MRI scanner to acquire brain images during rest and activation (fMRI). Part of the lab sessions will focus on assessment of image quality control and processing. The venue for the course will be at the Clinical Imaging Sciences Centre (CISC), University of Sussex, UK. (Prerequisites: PHYS-212 or equivalent course.) **Lab 6, Credits 3 (Summer)**

BIME-346 Imaging the Human Brain in vivo with MRI: a theoretical and hands-on approach

This course will introduce students to tools and concepts of human brain imaging in vivo. The course has a lecture and a lab component. Lectures will cover the fundamental principles of neuroscience, including brain anatomy and physiology, and neuroimaging techniques, with a focus on Magnetic Resonance Imaging (MRI). During lab sessions, students will use a 3 Tesla MRI scanner to acquire brain images during rest and activation (fMRI). Part of the lab sessions will focus on assessment of image quality control and processing. The venue for the course will be at the Clinical Imaging Sciences Centre (CISC), University of Sussex, UK. (Prerequisites: PHYS-212 or equivalent course.) **Lecture 6, Credits 3 (Summer)**

BIME-360 Biomedical Signal Analysis

Introduction to and application of signal processing techniques to evaluate and manipulate continuous time signals presumed to originate from systems that are linear, time invariant, and continuous time in nature. (Prerequisites: (BIME-182 or BIME-191) and MATH-231 or equivalent courses. Co-requisites: BIME-410 and (STAT-251 or MATH-251) or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

BIME-370 Introduction to Biomaterials Science

This course is intended to provide an overview of materials used in biomedical applications, both internal and external to the human body. The specific objective of this course is to present the principles which apply to the properties and selection of materials used in medical applications. Topics include an introduction to deformable mechanics and viscoelasticity; structure and properties of metals, ceramics, polymers, and composites; fundamental composition of biological tissues; and principles associated with the interaction between biological tissues and artificial materials. (Prerequisites: BIME-200 and CHMG-142 or equivalent courses. Co-requisite: BIOG-141 or BIOG-240 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

BIME-389 Special Topics

Topics and subject areas that are not regularly offered are provided under this course. Such courses are offered in a normal format; that is, regularly scheduled class sessions with an instructor. The level of complexity is commensurate with a junior-level undergraduate technical course. **Lecture 3, Credits 3 (Fall or Spring)**

BIME-391 Biomechanics and Biomaterials Lab

Laboratory experiments are conducted to explore and reinforce fundamental principles and concepts introduced in BIME-200 (Introduction to Musculoskeletal Biomechanics) and BIME-370 (Introduction to Biomaterial Science). The experimental procedures involve measuring results, analyzing and interpreting data and drawing objective conclusions. Emphasis is also placed on proper documentation and effective presentation of findings and results. Lab procedures involve manipulation and measurements of anatomical structures and samples as well as equipment and materials designed to simulate naturally occurring tissues and structures. (Prerequisite: BIME-200 or equivalent course. Co-requisites: BIME-370 and (BIME-182 or BIME-191) or equivalent courses.) **Lab 3, Credits 2 (Spring)**

BIME-391 Biomechanics and Biomaterials Lab

Laboratory experiments are conducted to explore and reinforce fundamental principles and concepts introduced in BIME-200 (Introduction to Musculoskeletal Biomechanics) and BIME-370 (Introduction to Biomaterial Science). The experimental procedures involve measuring results, analyzing and interpreting data and drawing objective conclusions. Emphasis is also placed on proper documentation and effective presentation of findings and results. Lab procedures involve manipulation and measurements of anatomical structures and samples as well as equipment and materials designed to simulate naturally occurring tissues and structures. (Prerequisite: BIME-200 or equivalent course. Co-requisites: BIME-370 and (BIME-182 or BIME-191) or equivalent courses.) **Lecture 1, Credits 2 (Spring)**

BIME-395 Biomed. Instr. Repair and Maintenance for Eng. World Health

This is a course that will prepare students for an international trip as part of Engineering World Health, they will be stationed in hospitals and assist with repairmen and maintenance of medical equipment and instrumentation. To this end, the course will cover both technical and cultural aspects of the trip, including language and cultural norms. From a technical standpoint, the course will cover the basics of the major types of medical equipment and their operation. The physiology underlying the measurement of each equipment will also be discussed. In addition, the course will focus on the major functional pieces for each instrument, and troubleshooting in the context of a developing country environment. A travel fee is required. (This course requires permission of the Instructor to enroll.) **Lec/Lab 3, Credits 0 - 2 (Fall)**

BIME-396 Biomedical Instr. Repair and Maintenance for EWH 2

This is the second part 2 of the Engineering World Healthy course and it follows the first part of the course that is taught during the Fall semester. Students participating in this course will have completed the international trip where they spent close to 3 weeks working in various hospitals in the developing country. During this course (part 2), we will focus on identifying the strengths and weaknesses of the students' preparation for the trip, review and record what they learned and experienced on the ground, develop ways on how to improve the experience for both students and hospital staff. Much of this is intended to increase students' leadership skills and awareness of global engineering challenges. To this end, students will be required to come up with ways to disseminate to their fellow students and campus at large the knowledge they acquired during their experience. (Prerequisite: BIME-395 or equivalent course.) **Lecture 1, Credits 1 - 3 (Spring)**

BIME-407 Medical Device Design

This course is an introduction to the biodesign process used for innovating medical technologies. Student teams will apply a needs-based assessment strategy to identify opportunities in a biomedical related field such as assistive technologies and rehabilitation engineering. Incorporating CAD will culminate in a virtual medical device prototype. Concepts of intellectual property, regulatory considerations, and reimbursement and business models will be introduced. (Prerequisite: BIME-499 or MECE-499 or ISEE-499 or CHME-499 or EEEE-499 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

BIME-410 Systems Physiology I

Based on an understanding of the fundamental components of cellular and molecular biology that provide the basis of a living biological entity, this course begins a two course sequence involving the description and analysis of physiological mechanisms from a systems point of view. The first course in this sequence will be concerned with fundamental aspects of electrophysiology, electrically excitable cells and tissue, the operation of the nervous system including the central, peripheral, somatic and autonomic systems, the special senses and the connection between the nervous system and the muscular system. Differences and relationships between speed, specificity and sensitivity of signaling mechanism of the nervous system will be discussed. The muscular system is introduced in terms of its ability to generate movement and force. The smooth muscle system will be discussed and compared to the skeletal system. (Prerequisites: BIME-370 and (BIME-320 or MECE-210) and PHYS-212 or (PHYS-208 and PHYS-209) and (BIOG-141 or BIOG-240) and MATH-221 and (BIME-250 or CHME-230) or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

BIME-411 Systems Physiology II

The second in a two course sequence involving the description and analysis of physiological mechanisms from a systems point of view. The focus of this course will be on the interaction between organ systems for the purpose of homeostasis. In particular, attention will be paid to feedback mechanisms that involve electrical and chemical feedback and control systems. Fluid and gas transport mechanisms associated with the cardiovascular and respiratory systems including their regulatory behavior and the function of the kidney are introduced by way of their contribution to fluid volume and pressures as well as its fundamental material exchange properties. The interaction between the systems and how they affect fluid and electrolyte balance, material exchange and disease processes will be discussed. Throughout the course, diseases and disorders of the various systems will be discussed. Students will learn to analyze the systems in a quantitative manner based on engineering analysis and how to model parts of systems. (Prerequisites: BIME-410 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

BIME-430 Bioprocess Engineering

This course is focused on fluid, heat and mass transfer processes for valuable bio-products such as bio-pharmaceuticals. In particular, this course reviews the topics of fluid mixing, heat transfer, mass transfer and a variety of unit operations (filtration, centrifugation, cell disruption, chromatography, etc.). The course includes several topics on fermenters/bioreactor design and downstream processing for cell culture operations. The course is intended to provide to the students with an understanding of transfer processes and an overview of the most common separation processes employed in bioengineering. (Prerequisites: BIME-250 and BIME-320 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

BIME-440 Biomedical Signals and Analysis

Introduction to and application of signal processing techniques to evaluate and manipulate continuous and discrete time signals presumed to originate from systems that may be either linear or non-linear, time invariant or varying and random or deterministic in nature. Representative data sets will be used to characterize and process signals from physiological systems and processes. A multi-week project will be assigned that will consist of processing and analysis of a typical biomedical signal source to provide a robust and consistent evaluation of some aspect associated with the signal source based on methods discussed both in class and reported on in the literature. (Prerequisites: BIME-182 and MATH-231 or equivalent course. Co-requisites: BIME-410 and (STAT-251 or MATH-251) or equivalent course.) **Lecture 4, Credits 4 (Spring)**

BIME-445 Biomedical Device Sensors and Interfacing

Students will be introduced to the basic design and interface of sensor systems that are commonly used in biomedical apparatus. We will discuss computer architecture; various analog electrical (voltage and current) interfaces; transducer and electro-mechanical interfacing (photodiodes, photomultipliers, radiation detectors, thermocouples, thermistors, pressure sensors, strain sensors, motors and solenoids); microprocessor design and use; basic analog-to-digital and digital-to-analog techniques; and elementary signal processing techniques, all as applied to biomedical equipment. (Prerequisites: MATH-221 or equivalent course. Co-requisites: BIME-440 or BIME-360 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

BIME-450 Numerical Analysis of Complex Biosystems

Numerical techniques necessary for engineering analysis are introduced that build upon concepts from core mathematics and engineering courses. Mathematical problems naturally arising in biomedical engineering are used to motivate the course topics and techniques taught. Tools such as MATLAB and Excel spreadsheets are used to implement numerical methods and examine data results. Topics include root-finding techniques for nonlinear equations, curve fitting using linear regression techniques, methods for solving systems of linear equations, numerical differentiation and integration methods, optimization techniques, and methods for reducing numerical error. (Prerequisites: (BIME-440 or BIME-360) and MATH-221 and (STAT-251 or MATH-251) or equivalent course.) **Lecture 3, Credits 3 (Fall)**

BIME-460 Dynamics and Control of Biomedical Systems

Application of engineering analysis, modeling, problem solving and design skills to characterize and manipulate the operation of biomedical systems for the purpose of remediating, supplanting, replacing or enhancing the function of physiological processes. This presumes that those same tools and skills can be used to model the observed and/or known function of the physiological systems and processes under consideration. In addition to lectures, homework and examinations, the course will a project oriented assignment to design and evaluate a model that faithfully duplicates and predicts the operation of that process or system. (Prerequisites: BIME-411 and (BIME-440 or BIME-360) or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

BIME-470 Advanced Quantitative Cell Culture Techniques

This hands-on course gives engineering students experience with different culture platforms and analysis techniques. Students will be given experiments relating to current literature and state of the art techniques in the area of Tissue Engineering. In a project-based course style, individual experiments require multiple weeks and students will be expected to maintain their own cultures. (Prerequisites: BIOG-240 or BIOL-201 or BIOL-240 or BIOL-315 or equivalent course.) **Lec/Lab 5, Credits 3 (Spring)**

BIME-480 Advanced Biomechanics and Applied Stress Analysis

A basic course intended to provide exposure of the upper year undergraduate Biomedical Engineering students to the fundamental principles of mechanics of materials and deformable bodies including topics such as stress, strain, deflections and failure modes and their interconnecting relationships. Common loading topics such axial, torsional, bending and shear loads will be explained, along with combined loading, stress transformations and failure criteria and their applications to biomechanics problems. (Prerequisite: BIME-200 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

BIME-489 Special Topics

Topics and subject areas that are not among the courses listed here are frequently offered under the special topics title. Under the same title also may be found experimental courses that may be offered for the first time. Such courses are offered in a formal format; that is, regularly scheduled class sessions with an instructor. The level of complexity is commensurate with a senior-level undergraduate technical course. (This course is restricted to BIME-BS Major students.) **Lecture 3, Credits 1 - 3 (Fall, Spring)**

BIME-491 Quantitative Physiological Signal Analysis Lab

Laboratory experiments are conducted to explore and reinforce fundamental principles and concepts introduced in BIME-410 (Systems Physiology I) and BIME-440 (Biomedical Signals and Analysis). The experimental procedures involve measuring results, analyzing and interpreting data and drawing objective conclusions. Emphasis is also placed on proper documentation and effective presentation of findings and results. Laboratory experiments will be conducted to investigate pressure, volume and flow relationships of the cardiovascular and respiratory systems including the inherent variability and dynamic response to perturbations. Signal processing methods will be utilized to address ubiquitous artifacts found in measured physiological signals. (Prerequisite: BIME-410 and (BIME-440 or BIME-360) or equivalent courses.) **Lab 3, Credits 1 (Fall)**

BIME-492 Systems Physiology Control and Dynamics Lab

Laboratory experiments are conducted to explore and reinforce fundamental principles and concepts introduced in BIME-411 (Systems Physiology II) and BIME-460 (Dynamics and Control of Biomedical Systems). The experimental procedures involve measuring results, analyzing and interpreting data and drawing objective conclusions. Emphasis is also placed on proper documentation and effective presentation of findings and results. Laboratory experiments and simulations will be conducted to enable the prediction, observation and characterization common physiological processes and systems. (Prerequisite: BIME-411 and ISEE-325 or equivalent course. Co-requisites: BIME-460 or equivalent course.) **Lab 3, Credits 1 (Fall)**

BIME-497 Multidisciplinary Senior Design I

This is the first in a two-course sequence oriented to the solution of real-world engineering design problems. This is a capstone learning experience that integrates engineering theory, principles, and processes within a collaborative environment. Multidisciplinary student teams follow a systems engineering design process, which includes assessing customer needs, developing engineering specifications, generating and evaluating concepts, choosing an approach, developing the details of the design, and implementing the design to the extent feasible, for example by building and testing a prototype or implementing a chosen set of improvements to a process. This first course focuses primarily on defining the problem and developing the design, but may include elements of build/ implementation. The second course may include elements of design, but focuses on build/implementation and communicating information about the final design. (5th yr KGCOE & BIME-499) **Lecture 6, Credits 3 (Fall)**

BIME-498 Multidisciplinary Senior Design II

This is the second in a two-course sequence oriented to the solution of real-world engineering design problems. This is a capstone learning experience that integrates engineering theory, principles, and processes within a collaborative environment. Multidisciplinary student teams follow a systems engineering design process, which includes assessing customer needs, developing engineering specifications, generating and evaluating concepts, choosing an approach, developing the details of the design, and implementing the design to the extent feasible, for example by building and testing a prototype or implementing a chosen set of improvements to a process. The first course focuses primarily on defining the problem and developing the design, but may include elements of build/ implementation. This second course may include elements of design, but focuses on build/implementation and communicating information about the final design. (Prerequisites: BIME-497 or equivalent course.) **Lecture 6, Credits 3 (Spring)**

BIME-499 Co-op

One semester of paid work experience in biomedical engineering. (This course is restricted to BIME-BS Major students.) **CO OP, Credits 0 (Fall, Spring)**

BIME-510 Bioanalytical Microfluidics

This course is focused on the analysis and separation of high value biological products employing microfluidic devices. The course will cover miniaturization, microfabrication, microfluidics and electrohydrodynamic flow; as well as the most common separation techniques employed in bio-analytical microdevices: chromatography, electrophoresis, dielectrophoresis, cytometry and electrochemistry. Students will also become familiar with the recent literature on bioanalytical applications in microfluidics devices, recent journal articles will be presented in class by the professor and the students. The course also includes three "hands on" laboratory modules. Students will fabricate microfluidic devices and then use these devices to perform experiments with electroosmotic flow and dielectrophoresis. (Prerequisite: CHME-320 or BIME-320 or MECE-210 or MCET-330 or equivalent course and at least 4th year standing.) **Lecture 3, Credits 3 (Spring)**

BIME-520 Hemodynamics

This course will focus on the application of fluid mechanics principles to vascular blood flow and flow dynamics. It will cover concepts such as the vascular system and flow patterns in different segments (i.e., blood, heart, arteries and veins), parameters and measures of flow dynamics, including pressure, flow rate, and vascular resistance; fully developed laminar flow (Poiseuille's Law), applications of electrical analogous and optimality for modeling vascular flow using Poiseuille's Law; equations of fluid flow (Continuity, Bernoulli, Navier-Stokes). In addition, the course will also cover the principles of microcirculation briefly, as well as the principles of pulsatile flow and wave propagation in both rigid and elastic vessels. Lastly, we will briefly cover the concepts of large artery hemodynamics and its effect on the vascular disease and medical imaging and blood flow (i.e., Doppler flow imaging, phase-contrast MRI and arterial spin labeling) techniques. (Prerequisite: CHME-321 or BIME-320 or MECE-210 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

BIME-560 Introduction to Medical Imaging Systems
 This introductory course is aimed to cover the physics and math underlying the main medical imaging systems: computed tomography (CT) X-Ray, Ultrasound, magnetic resonance imaging (MRI), Nuclear Medicine both positron emission tomography (PET) and single photon emission computed tomography (SPECT). The course will cover how signals from these systems are formed and then used to create images of various organs/tissues in vivo. Through examples of biomedical applications, students will learn how images from each modality are used for diagnostic and research purposes. Concepts, such as Fourier Transform, Convolution, Smoothing, Signal-to-noise (SNR), spatial and temporal resolution, will be covered in the context of biomedical applications. While various organs will be covered, the main focus of the course will be neuroscience applications, particularly brain imaging and human brain mapping. (Prerequisite: BIME-360 or BIME-440 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

BIME-570 Tissue Engineering
 This course is intended to provide an overview of how replacement organs and tissues can be engineered using both natural and synthetic biomaterials that direct cellular differentiation and integration. The objectives of the course are to present how tissues can be engineered using the physical and chemical properties of biomaterials and targeted differentiation of multi- and pluripotent stem cells. Topics include the adhesion, migration, growth and differentiation of cells as well as the optimization and modeling of molecular and cellular transport within and across engineered tissues. Additionally, the course will investigate the engineering parameters and necessary functionality of artificial tissues. (Prerequisite: BIME-370 or equivalent course and 4th year standing.) **Lecture 3, Credits 3 (Spring)**

BIME-589 Special Topics
 Topics and subject areas that are not regularly offered are provided under this course. Such courses are offered in a normal format; that is, regularly scheduled class sessions with an instructor. The level of complexity is commensurate with an upper-level undergraduate technical course. **Lecture 3, Credits 3 (Fall or Spring)**

BIME-599 Independent Study
 Allows upper-level undergraduate students an opportunity to independently investigate, under faculty supervision, aspects of the field of biomedical engineering that are not sufficiently covered in existing courses. Proposals for independent study activities must be approved by both the faculty member supervising the independent study and the department head. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 4 (Fall, Spring)**

Chemical Engineering

CHME-181 Chemical Engineering Insights I
 This is the first course of a two-course sequence that provides the foundation for success in the chemical engineering program at RIT and the field of chemical engineering. This course provides a historical perspective on the origin of the discipline and an overview of the traditional and contemporary issues that chemical engineers address. Within this context, the course compares and contrasts the differing roles of chemical engineers and chemists in society. Additionally the course introduces the methodology chemical engineers use to solve problems, engineering ethics, and career options in chemical engineering. (This class is restricted to CHME-BS or ENGRX-UND Major students.) **Lecture 3, Credits 1 (Fall)**

CHME-182 Chemical Engineering Insights II
 This course examines how chemical engineering analysis can be applied to address some of society's current and future challenges. Particular attention is focused on the size and scale of a system and its affect on the engineering constraints and the ultimate solution of problems. The course enables students to recognize that the processes and equipment that chemical engineers design to solve local problems affect the broader problems that society faces, such as the supply of energy and preservation of the environment. The course demonstrates the power of the system balance as an essential tool for engineering analysis, and provides students with some elementary training in its use. (This class is restricted to CHME-BS or ENGRX-UND Major students.) **Lecture 3, Credits 1 (Spring)**

CHME-230 Chemical Process Analysis
 A first course for chemical engineers, introducing units, dimensions and dimensional analysis, simple material balances for batch and continuous systems in steady and unsteady states with and without chemical reaction, and elementary phase equilibrium in multiple component systems. Energy balances on non-reactive systems in open and closed systems are introduced. (Prerequisites: CHMG-142 and CHME-182 or equivalent courses or student standing in CHME-BS or ENGRX-UND. Co-requisite: MATH-182 or equivalent course.) **Lecture 4, Credits 3 (Fall)**

CHME-301 Analytical Techniques for Chemical Engineering I
 Mathematical and computational techniques necessary for engineering analysis are introduced that augment training from core mathematics and engineering courses. The spreadsheet environment is used to implement mathematical procedures and examine results. Topics covered include roots of equations, fitting equations to data, solution of systems of algebraic equations, interpolation, optimization, numerical differentiation and integration, and the numerical solution of ordinary differential equations. Techniques are applied to mathematical problems arising in chemical engineering using Microsoft Excel. (Prerequisites: MATH-221 and MATH-231 or equivalent courses.) **Lab 3, Credits 3 (Spring)**

CHME-301 Analytical Techniques for Chemical Engineering I
 Mathematical and computational techniques necessary for engineering analysis are introduced that augment training from core mathematics and engineering courses. The spreadsheet environment is used to implement mathematical procedures and examine results. Topics covered include roots of equations, fitting equations to data, solution of systems of algebraic equations, interpolation, optimization, numerical differentiation and integration, and the numerical solution of ordinary differential equations. Techniques are applied to mathematical problems arising in chemical engineering using Microsoft Excel. (Prerequisites: MATH-221 and MATH-231 or equivalent courses.) **Recitation 1, Credits 3 (Spring)**

CHME-302 Analytical Techniques for Chemical Engineering II
 This course introduces the student to more advanced mathematical and numerical methods necessary for engineering analysis. Mathematical problems naturally arising in chemical engineering are used to motivate the course topics and techniques taught. The MATLAB programming environment is utilized to facilitate computation, and students learn to use MATLAB's inbuilt tools as well as Simulink. Topics examined include the solution of systems of linear and nonlinear equations and the solution of ordinary differential equations (initial value problems). Some important topics covered in CHME-301 are re-examined in the MATLAB environment, such as roots of equations, curve fitting, and numerical integration and differentiation. (Prerequisite: CHME-301 and CHME-499 or equivalent courses.) **Lec/Lab 3, Credits 3 (Fall)**

CHME-310 Applied Thermodynamics
 This is a course in the fundamentals of both single and multiple-component thermodynamics. The first and second laws of thermodynamics and concepts of entropy and equilibrium are examined in open and closed control volume systems. Energy, work, and heat requirements of various unit operations are examined. Equations of states and properties of fluids are explored. Phase transition and equilibrium involving single- and multiple components are examined for both ideal and non-ideal systems. Energy released/absorbed during chemical reaction and solution creation are imbedded in analysis of chemical engineering processes (Prerequisites: CHME-230 and MATH-231 or equivalent courses.) **Lecture 4, Credits 3 (Spring)**

CHME-320 Continuum Mechanics I
 This course focuses on an introduction both fluid flow and heat transfer. In the first two thirds of the course, mass and force balances on control volumes are considered in both static and dynamic situations. Hydrostatic effects in manometers and static forces are calculated. Bernoulli's Equation and applications are considered. Head losses and pumping requirements are considered in piping systems with laminar and turbulent flow. Friction factors for internal flows are also studied. In the last third of the course, fundamentals of heat transfer are introduced from a point-wise yet continuum perspective involving conduction, convection, and radiation. Simplifying approximations of conduction, convection, and radiation dominated heat transfer are introduced, and combined modes of transfer are analyzed. (Prerequisites: CHME-230 and MATH-231 and PHYS-211 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

CHME-321 Continuum Mechanics II
 This course is the continuation of fluid flow and heat transfer taught in Continuum Mechanics I (CHME-320) I. First half of the course is focused on heat transfer. Fins and extended surfaces, Heat exchangers, Internal and External flow for a variety of common configurations are studied. Open ended design problems involving heat transfer applications are solved to further understand practical applications. In the second part of the course, concepts of fluid are reiterated with more focus on energy balances and pipe flows. Pumps and fluid flow machinery are studied to understand their performance and efficiencies. (Prerequisites: CHME-320 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

CHME-330 Mass Transfer Operations
 This course covers the analysis and design of chemical processes for the separation and purification of mixtures. The course includes an introduction to the fundamentals of diffusion leading up to mass transfer coefficients and their use in solving a variety of engineering problems. Design methodologies are examined for equilibrium based processes (such as absorption, stripping, and distillation). Rate-based separation processes, including packed columns and batch adsorption, are examined and contrasted with equilibrium-based processes. (Prerequisites: CHME-230 and CHME-310 and MATH-231 or equivalent courses.) **Lecture 4, Credits 3 (Spring)**

CHME-340**Reaction Engineering**

The fundamentals of chemical kinetics are integrated with the concepts of mass and energy conservation, from both a macroscopic and microscopic perspective, to develop models that describe the performance of chemical reactors. Topics include mass action kinetics and absolute rate theory, series and parallel reaction systems, and the mathematical modeling of various reactor configurations. The conceptual framework and tools are developed to understand and design chemical reactor processes and to interpret experimental data obtained on a laboratory scale to design pilot scale and full scale manufacturing processes. (Prerequisites: CHME-230 and CHME-310 and MATH-231 or equivalent courses.) **Lecture 4, Credits 4 (Fall)**

CHME-350**Multiple Scale Material Science**

This course provides the student with an overview of structure, properties, and processing of metals, polymers, ceramics and composites. Structural imperfections, atom packing, and phase diagrams are also discussed. The course develops a basic understanding of the structure/properties relationship in materials and introduces the principles governing phenomena occurring on the smallest continuum scales. Topics include force fields and interatomic bonding, crystallography, microscopy, order-disorder transitions and solidification phenomena. Conventional chemical engineering analyses topics, such as transport processes and thermodynamics, are adjusted and extended to the micro[nano]-scale. (Prerequisites: CHME-310 and CHMO-231 and CHMO-235 and CHME-499 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

CHME-391**Chemical Engineering Principles Lab**

Students are introduced to basic equipment and methodologies for designing laboratory experiments, measuring results, interpreting data, and drawing objective conclusions. Students work in teams to design experimental procedures, identify lab equipment, and assemble simple apparatus to achieve specific experimental goals. (Prerequisite: CHME-230 or equivalent course. Co-requisite: CHME-320 or equivalent course.) **Lab 6, Credits 2 (Spring)**

CHME-401**System Dynamics and Control**

The dynamic behavior of chemical process components is examined. The mathematics of Laplace transforms are examined extensively as a fundamental underpinning of control theory. Block diagrams, feedback control systems, and stability analysis are introduced. (Prerequisites: CHME-302 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

CHME-421**Interfacial Phenomena**

This course covers the fundamental principles of interfacial phenomena incorporating unique physics and chemistry associated with interfaces arising between liquids, gases, and solids. It is designed to introduce students to the significance of interfacial science in important engineering applications such as the wetting behavior of liquids on solid surfaces, the coating of thin liquid films, the formation of dispersed phases, and colloid & nanoparticle technology. (Prerequisites: CHMG-141 and CHME-310 and MATH-231 or equivalent courses.) **Lecture 3, Credits 3**

CHME-422**Introduction to Applied Rheology**

Complex fluids encountered in manufacturing, commercial products, and in nature, such as polymer solutions and melts, blood and other biological fluids, foams, slurries and emulsions, exhibit complex flow behaviors called non-Newtonian because they are not exhibited by low-molecular-weight fluids like air and water. Rheology is the study of deformation and flow. Rheological phenomena, their connection to fluid microstructure, and the characterization of complex fluids using commercial instruments and constitutive equations are introduced. This foundation is applied to elements of materials processing including flow and heat transfer in tubes and in boundary layers, mixing, and the drag of liquid on particles. Specialized manufacturing methods such as extrusion and the pumps and mixers required for these fluids are covered. (Prerequisites: CHME-301 and CHME-321 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

CHME-431**Advanced Separation Processes**

This upper-level undergraduate course builds on concepts taught in CHME-330 Mass Transfer Operations. Topics covered include adsorption, membrane separation, extraction, crystallization, and mechanical separation processes. Transient systems are introduced and analyzed to augment steady-state analyses from CHME-330. Case studies are examined to connect fundamental concepts to real world applications (Prerequisites: CHME-330 and MATH-231 or equivalent courses or permission of instructor.) **Lecture 3, Credits 3 (Fall or Spring)**

CHME-451**Analysis of MultiScale Processes**

Heat transfer and diffusive transport in continuous media (solids, liquids, and gases) are examined over differential lengths. Heat and mass transfer coefficients used in engineering design are extracted from a precise description of local transport. Exact solutions of the differential equations governing fluid mechanics are examined under both steady state and transient conditions, and these analyses are used to determine forces on bodies and friction factors in pipe flows. The important interplay between differential and larger-scale analyses in engineering is emphasized. (Prerequisites: CHME-321 and CHME-330 and CHME-340 and CHME-350 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

CHME-489**Special Topics**

Topics and subject areas that are not among the courses listed here are frequently offered under the special topics title. Under the same title also may be found experimental courses that may be offered for the first time. Such courses are offered in a formal format; that is, regularly scheduled class sessions with an instructor. The level of complexity is commensurate with a senior-level undergraduate technical course. **Lecture 3, Credits 3 (Fall, Spring)**

CHME-490**Design with Constraint**

This course examines typical constraints on design and their integration with technology. Economics, environmental considerations, hazards analysis, ethics, and globalization and supply chain management ideas are among the concepts introduced. Modern examples that integrate knowledge of unit operations and processes with design constraints are examined. (Co-requisites: CHME-451 or equivalent course.) **Lab 1, Credits 3 (Fall)**

CHME-490**Design with Constraint**

This course examines typical constraints on design and their integration with technology. Economics, environmental considerations, hazards analysis, ethics, and globalization and supply chain management ideas are among the concepts introduced. Modern examples that integrate knowledge of unit operations and processes with design constraints are examined. (Co-requisites: CHME-451 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

CHME-491**Chemical Engineering Processes Lab**

This course extends the laboratory experience from the previous Chemical Engineering Principles Lab, and focuses on unit operations common to engineering practice. Students work in teams to design experimental procedures on existing equipment, and to in some cases, manipulate experimental apparatus to achieve specific experimental goals. (Prerequisites: CHME-391 and CHME-499 or equivalent courses. Co-requisites: CHME-340 or equivalent course.) **Lab 6, Credits 2 (Fall)**

CHME-492**Advanced Design Capstone**

Students work in teams to design and simulate a realistic chemical manufacturing plant. An assigned project requires students to draw on, and integrate, knowledge from all core chemical engineering courses taken over the previous 5 years. The course is taught in the chemical engineering computer lab and makes extensive use of both chemical process simulation software (ChemCad), software for drawing piping and instrumentation diagrams (P&ID's) as well as online resources that chemical engineers use to size and select parts and equipment. (Prerequisites: CHME-490 or equivalent course.) **Lab 6, Credits 3 (Spring)**

CHME-499**Co-op**

One semester of paid work experience in chemical engineering. **CO OP, Credits 0 (Fall, Spring)**

CHME-510**Advanced Thermodynamics**

The course extends the concepts of energy, entropy, phase equilibrium and multi-component mixtures from ideal to real fluids via the introduction of state functions, fluid models and generalized conditions for equilibrium of solutions and phases. Models for real-fluid behavior are implemented in the context of actual chemical processes. Additionally, real-fluid behavior is linked to molecular properties in order to introduce predictive approaches to fluid behavior. (Prerequisites: CHME-301 and CHME-310 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

CHME-511**Statistical Thermodynamics**

This course draws a connection between molecular scale phenomena and concepts in undergraduate chemical engineering thermodynamics. The ideal gas law is derived from first principles, entropy is defined from a molecular perspective, and chemical potential (and fugacity) is viewed as a derivative of the partition function rather than an "ad-hoc" correction parameter for vapor-liquid equilibrium. Using the thermodynamic ensembles and multivariable calculus, a unified approach to convert between all thermodynamic variables is presented. A special emphasis is provided on the phase separation of gas-mixtures and liquid-mixtures to enable the design of solvents for applications. (Prerequisites: CHME-301 and CHME-310 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

CHME-540**Advanced Reaction Engineering**

The application of ideal reactor concepts and analyses is extended to the design, modeling and performance evaluation of reactors used in manufacturing processes. Catalytic reactions are discussed in terms of mechanisms and kinetics, and used to design, model and evaluate the performance of fixed bed, suspended bed and other types of catalytic reactors. Concepts of mass transport limitations and non-ideal flows are introduced to provide the framework for the analysis of deviations from ideal behavior experienced by real reactors. (Prerequisites: CHME-340 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

CHME-550 Electrochemical Engineering
The course focuses on applications of electrochemical phenomena with examples of practical materials and processes. Fundamental considerations will include charge transfer at electrode/electrolyte interfaces, surface modification by electrodeposition and etching, and corrosion. Electroanalytical techniques will be described including potentiometry, voltammetry, and electrochemical impedance analysis. Applications of electrochemical engineering will be summarized in detail for batteries, capacitors, and fuel cells; including conventional materials and fabrication techniques. A special emphasis on the use of nanomaterials in electrochemical engineering will be investigated. (Prerequisites: CHME-350 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

CHME-589 Special Topics
Topics and subject areas that are not regularly offered are provided under this course. Such courses are offered in a normal format; that is, regularly scheduled class sessions with an instructor. The level of complexity is commensurate with an upper-level undergraduate technical course. **Lecture 3, Credits 3 (Fall, Spring)**

CHME-599 Independent Study
Allows upper-level undergraduate students an opportunity to independently investigate, under faculty supervision, aspects of the field of chemical engineering that are not sufficiently covered in existing courses. Proposals for independent study activities must be approved by both the faculty member supervising the independent study and the department head. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 4 (Fall, Spring)**

Computer Engineering

CMPE-110 Introduction to Computer Engineering
This course overviews the field of computer engineering, the computer engineering curriculum at RIT, and research and career opportunities. The topics covered include basic circuit analysis, number systems, digital logic, programming, robotics, laboratory equipment, teamwork, critical thinking, technical writing, modern and contemporary issues, ethics, diversity, and communication skills. **Lab 2, Credits 1 (Fall)**

CMPE-110 Introduction to Computer Engineering
This course overviews the field of computer engineering, the computer engineering curriculum at RIT, and research and career opportunities. The topics covered include basic circuit analysis, number systems, digital logic, programming, robotics, laboratory equipment, teamwork, critical thinking, technical writing, modern and contemporary issues, ethics, diversity, and communication skills. **Lecture 1, Credits 1 (Fall)**

CMPE-160 Digital System Design I
This course covers the specification, analysis, modeling and design of digital systems. Standard modules, such as decoders, multiplexers, shifter registers, adders, and counters, will be analyzed. Lectures will discuss fundamental design methodologies, state machines, and digital system modeling with the use of VHDL as a hardware description language. The laboratory provides hands-on experiences of the design, modeling, implementation, and testing of digital systems using commercial IC components as well as CAD tools. (Co-requisite: CSCI-105 or CSCI-140 or CSCI-141 or equivalent course.) **Lab 2, Credits 3 (Fall, Spring)**

CMPE-160 Digital System Design I
This course covers the specification, analysis, modeling and design of digital systems. Standard modules, such as decoders, multiplexers, shifter registers, adders, and counters, will be analyzed. Lectures will discuss fundamental design methodologies, state machines, and digital system modeling with the use of VHDL as a hardware description language. The laboratory provides hands-on experiences of the design, modeling, implementation, and testing of digital systems using commercial IC components as well as CAD tools. (Co-requisite: CSCI-105 or CSCI-140 or CSCI-141 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

CMPE-161 Introduction to VHDL
This course presents different approaches to digital system modeling and design with the use of VHDL. The lab sessions include specification and design of combinational and sequential systems. Industry-standard simulation tools will be used in the course, which will enable students gain hands-on experience. (Prerequisites: EEEE-120 or equivalent course.Co-requisites: CSCI-141 or CSCI-140 or CSCI-105 or equivalent course.) **Lab 2, Credits 0 (Fall, Spring)**

CMPE-161 Introduction to VHDL
This course presents different approaches to digital system modeling and design with the use of VHDL. The lab sessions include specification and design of combinational and sequential systems. Industry-standard simulation tools will be used in the course, which will enable students gain hands-on experience. (Prerequisites: EEEE-120 or equivalent course.Co-requisites: CSCI-141 or CSCI-140 or CSCI-105 or equivalent course.) **Lecture 3, Credits 0 (Fall, Spring)**

CMPE-240 Engineering Fundamentals of Computer Systems
This course introduces the computer engineering fundamentals upon which current computer systems are based. Discussion of the machine-level representation of data, Boolean algebra and simple logic circuits describes the hardware foundations for modern computer systems. An introduction to instruction set design and assembly language provides the student with an understanding of the interface between hardware and software. The course concludes by discussing high-level architectural design and networking emphasizing its effect on program performance. (Prerequisites: (MATH-190 or 1055-265) and (CSCI-140, CSCI-142 or CSCI-242 or 4003-243) or equivalent courses.) **Lecture 4, Credits 4 (Fall, Spring)**

CMPE-250 Assembly and Embedded Programming
This course introduces embedded systems, along with fundamental computer organization, assembly language programming, and mixed language programming with C and assembly. Using a modern microcontroller and embedded systems IDE, such as the ARM Cortex-M0+ and Keil Microcontroller Development Kit, the course covers embedded programming concepts and interface modules, as well as addressing methods, machine instructions, assembler directives, macro definitions, code relocatability, subroutine linkage, data structures, I/O programming, exception processing, and interrupts. Program design techniques necessary to write efficient, maintainable device drivers are considered. (Prerequisites: CMPE-160 or EEEE-120 or equivalent courses.Co-requisites: CSCI-140 or CSCI-142 or CSCI-242 or equivalent courses.) **Lab 2, Credits 3 (Fall, Spring)**

CMPE-250 Assembly and Embedded Programming
This course introduces embedded systems, along with fundamental computer organization, assembly language programming, and mixed language programming with C and assembly. Using a modern microcontroller and embedded systems IDE, such as the ARM Cortex-M0+ and Keil Microcontroller Development Kit, the course covers embedded programming concepts and interface modules, as well as addressing methods, machine instructions, assembler directives, macro definitions, code relocatability, subroutine linkage, data structures, I/O programming, exception processing, and interrupts. Program design techniques necessary to write efficient, maintainable device drivers are considered. (Prerequisites: CMPE-160 or EEEE-120 or equivalent courses.Co-requisites: CSCI-140 or CSCI-142 or CSCI-242 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

CMPE-257 Introduction to Quantum Computing and Information Science
This course teaches the fundamentals of quantum information science with a focus on quantum cryptography and quantum computing. Two state systems (e.g., quantum bits) will be used to introduce foundational ideas in quantum mechanics and the appropriate mathematical formalism needed to understand communication protocols (e.g., quantum key distribution), quantum logic gates, circuits, and algorithms (e.g., Shor's factoring algorithm). Students will learn about the potential applications of quantum computers and gain hands on experience with quantum computing tools and simulators developed by quantum computing hardware companies. (Prerequisites: (PHYS-111 or PHYS-211) and (MATH-172 or MATH-182 or MATH-182A) or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

CMPE-260 Digital System Design II
This course presents modern approaches to the design, modeling and testing of digital system. Topics covered are: VHDL and Verilog HDL as hardware description languages (HDLs), simulation techniques, design synthesis, verification methods, and implementation with field programmable gate arrays (FPGAs). Combinational and both the synchronous and asynchronous sequential circuits are studied. Testing and design for testability techniques are emphasized and fault tolerant and fail safe design concepts are introduced. Laboratory projects that enable students gain hands-on experience are required. The projects include complete design flow: design of the system, modeling using HDLs, simulation, synthesis and verification. (Prerequisites: CMPE-160 or CMPE-161 or equivalent courses.Co-requisites: PHYS-212 or PHYS-208 or EEEE-281 or equivalent courses.) **Lab 2, Credits 4 (Fall, Spring)**

CMPE-260 Digital System Design II
This course presents modern approaches to the design, modeling and testing of digital system. Topics covered are: VHDL and Verilog HDL as hardware description languages (HDLs), simulation techniques, design synthesis, verification methods, and implementation with field programmable gate arrays (FPGAs). Combinational and both the synchronous and asynchronous sequential circuits are studied. Testing and design for testability techniques are emphasized and fault tolerant and fail safe design concepts are introduced. Laboratory projects that enable students gain hands-on experience are required. The projects include complete design flow: design of the system, modeling using HDLs, simulation, synthesis and verification. (Prerequisites: CMPE-160 or CMPE-161 or equivalent courses.Co-requisites: PHYS-212 or PHYS-208 or EEEE-281 or equivalent courses.) **Lecture 3, Credits 4 (Fall, Spring)**

CMPE-350**Computer Organization**

The course covers the important aspects of the design, organization, and performance evaluation of modern computer systems. Topics include computer performance measures, instruction set architecture classification, input/output organization, CPU datapath and control unit design, microprogramming, arithmetic and logic unit design, and the memory hierarchy, including cache levels and virtual memory. (Prerequisites: CMPE-250 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

CMPE-380**Applied Programming in C**

This course uses the C language to implement algorithms used in the numerical solution of common problems encountered in science and engineering. Topics include an introduction to C, computer number representation and roundoff error, algorithms for finding roots of non-linear equations, interpolation, threading, software security, numerical differentiation and integration, function approximation and data fitting solutions to systems of linear equations, and general matrix manipulation. (Prerequisites: MATH-241 and CMPE-250 or equivalent courses.) **Lab 2, Credits 3 (Fall, Spring)**

CMPE-380**Applied Programming in C**

This course uses the C language to implement algorithms used in the numerical solution of common problems encountered in science and engineering. Topics include an introduction to C, computer number representation and roundoff error, algorithms for finding roots of non-linear equations, interpolation, threading, software security, numerical differentiation and integration, function approximation and data fitting solutions to systems of linear equations, and general matrix manipulation. (Prerequisites: MATH-241 and CMPE-250 or equivalent courses.) **Lecture 2, Credits 3 (Fall, Spring)**

CMPE-460**Interface and Digital Electronics**

This course covers various sensors, motors, signal conditioning circuits including amplification, filtering, level shifting, ADC, and DAC. Modern tools, such as Keil ARM MDK and PSpice will be used to simulate and debug modern microcontrollers, such as NXP Kinetis, analog active filters, and operational amplifier application circuits. Each team of two students is required to design a complete data acquisition system from sensors, amplification, filtering, ADC, and DAC to analog outputs through either wired transmission or wireless transmission circuits (Prerequisites: EEEE-282 and (EEEE-380 or EEEE-381) and CMPE-250 or equivalent courses. Corequisites: CMPE-380 or equivalent course.) **Lab 2, Credits 4 (Fall, Spring)**

CMPE-460**Interface and Digital Electronics**

This course covers various sensors, motors, signal conditioning circuits including amplification, filtering, level shifting, ADC, and DAC. Modern tools, such as Keil ARM MDK and PSpice will be used to simulate and debug modern microcontrollers, such as NXP Kinetis, analog active filters, and operational amplifier application circuits. Each team of two students is required to design a complete data acquisition system from sensors, amplification, filtering, ADC, and DAC to analog outputs through either wired transmission or wireless transmission circuits (Prerequisites: EEEE-282 and (EEEE-380 or EEEE-381) and CMPE-250 or equivalent courses. Corequisites: CMPE-380 or equivalent course.) **Lecture 3, Credits 4 (Fall, Spring)**

CMPE-480**Digital Signal Processing**

This course introduces the basic elements of continuous and discrete time signals and systems and fundamental signal processing techniques, such as FIR and IIR Filtering, the Fourier transform, the Discrete Fourier transform and the z transform. Theory is strengthened through MATLAB-based projects and exercises. (Prerequisites: MATH-231 and MATH-241 and EEEE-282 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

CMPE-489**Special Topics**

Topics and subject areas that are not among the courses listed here are frequently offered under the special topics title. Under the same title also may be found experimental courses that may be offered for the first time. Such courses are offered in a formal format; that is, regularly scheduled class sessions with an instructor. The level of complexity is commensurate with a senior-level undergraduate technical course. **Lecture 3, Credits 3 (Fall, Spring)**

CMPE-495**Computer Engineering Senior Projects I**

The first course of a two-semester capstone undergraduate design projects course in computer engineering. Covers engineering design process and formulating project proposals. Students propose a team multidisciplinary design project, individually undertake an independent analysis of one of its subsystems, and formulate a formal team proposal for the project to be completed in the following course. (Prerequisites: CMPE-460 and at least 4th year standing in CMPE-BS with a minimum of 2 terms of co-op completed.) **Lecture 3, Credits 3 (Fall, Spring)**

CMPE-496**Computer Engineering Senior Projects II**

The conclusion of a two-course capstone undergraduate design projects course in computer engineering. Students will have prepared for the multidisciplinary team project during the previous course and will have done detailed project analysis over the intervening period. This course begins with project design reviews presented to the class and selected faculty members. Project performance analysis and reliability are major metrics. (Prerequisite: CMPE-495 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

CMPE-497**Multidisciplinary Senior Design I**

This is the first in a two-course sequence oriented to the solution of real-world engineering design problems. This is a capstone learning experience that integrates engineering theory, principles, and processes within a collaborative environment. Multidisciplinary student teams follow a systems engineering design process, which includes assessing customer needs, developing engineering specifications, generating and evaluating concepts, choosing an approach, developing the details of the design, and implementing the design to the extent feasible, for example by building and testing a prototype or implementing a chosen set of improvements to a process. This first course focuses primarily on defining the problem and developing the design, but may include elements of build/ implementation. The second course may include elements of design, but focuses on build/implementation and communicating information about the final design. (Prerequisites: CMPE-460 and at least 4th year standing in CMPE-BS with a minimum of 2 terms of co-op completed.) **Studio 6, Credits 3 (Fall, Spring)**

CMPE-498**Multidisciplinary Senior Design II**

This is the second in a two-course sequence oriented to the solution of real-world engineering design problems. This is a capstone learning experience that integrates engineering theory, principles, and processes within a collaborative environment. Multidisciplinary student teams follow a systems engineering design process, which includes assessing customer needs, developing engineering specifications, generating and evaluating concepts, choosing an approach, developing the details of the design, and implementing the design to the extent feasible, for example by building and testing a prototype or implementing a chosen set of improvements to a process. The first course focuses primarily on defining the problem and developing the design, but may include elements of build/ implementation. This second course may include elements of design, but focuses on build/implementation and communicating information about the final design. (Prerequisite: CMPE-497 or equivalent course.) **Studio 6, Credits 3 (Fall, Spring)**

CMPE-499**Co-op**

After completing Co-op Seminar (EGEN-099) or Co-op Workshop as well as meeting Co-op enrollment requirements, Computer Engineering students should register for CMPE-499 for each term of full-time, paid employment in the Computer Engineering field. Students who take on Spring-Summer or Summer-Fall Co-ops must register for both the semester term and the summer term. Students must obtain permission from the Computer Engineering office for any exception to the assigned Co-op blocks. (This class is restricted to CMPE-BS students with at least 3rd year standing who have completed EGEN-99, EEEE-281, SWEN-261 and CMPE-260 or CMPE-499.) **CO OP, Credits 0 (Fall, Spring, Summer)**

CMPE-530**Digital Integrated Circuit Design**

This course will cover the basic theory and techniques of Digital Integrated Circuit Design in CMOS technology. Topics include CMOS transistor theory and operation, design and implementation of CMOS circuits, fabrication process, layout and physical design, delay and power models, static and dynamic logic families, testing and verification, memory and nanoscale technologies. Laboratory assignments and project facilitate in hands-on learning of circuit-level design and simulation, layout and parasitic extractions, pre and post-layout verification and validation, full-custom flow and Synthesis based flow, using industry standard CAD tools. (Prerequisites: CMPE-260 and EEEE-282 and (EEEE-380 or EEEE-381) or equivalent courses.) **Lab 2, Credits 3 (Fall, Spring)**

CMPE-530**Digital Integrated Circuit Design**

This course will cover the basic theory and techniques of Digital Integrated Circuit Design in CMOS technology. Topics include CMOS transistor theory and operation, design and implementation of CMOS circuits, fabrication process, layout and physical design, delay and power models, static and dynamic logic families, testing and verification, memory and nanoscale technologies. Laboratory assignments and project facilitate in hands-on learning of circuit-level design and simulation, layout and parasitic extractions, pre and post-layout verification and validation, full-custom flow and Synthesis based flow, using industry standard CAD tools. (Prerequisites: CMPE-260 and EEEE-282 and (EEEE-380 or EEEE-381) or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

CMPE-540**Control Systems**

Provides a comprehensive introduction to the basic theory and essential techniques for analysis and design of linear control systems and their digital implementation using transform methods and frequency response approaches. MATLAB, Control System Toolbox and SIMLINK are utilized for analysis, design and simulations. (Prerequisites: MATH-231 and CMPE-480 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

CMPE-550

Computer Architecture

The course covers various aspects of advanced uniprocessor computer architecture design. Instruction set architecture design alternatives are discussed with emphasis on the Reduced Instruction Set Computer (RISC) architecture. Techniques to enhance CPU performance such as pipelined execution optimizations, conditional branch handling techniques, exploitation of instruction-level parallelism, multiple-instruction issue, and dynamic scheduling are studied. Cache, and memory hierarchy design and performance issues are also presented. The design aspects of efficient and reliable input/output systems are also covered. The course concludes with an introduction to concepts of multiprocessor systems design. (Prerequisite: CMPE-350 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

CMPE-570

Data and Communication Networks

This course will give an overview of the technologies, architectures and protocols used to build various types of computer and communication networks - wired or wireless. The emphasis will be placed on discussions of various network design problems and solution approaches. Specific issues covered in this course include: framing and coding, error detection, multiple access control, addressing, routing, flow and congestion control, scheduling and switching. (Prerequisites: MATH-251 or 1016-345 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

CMPE-599

Independent Study

Allows upper-level undergraduate students an opportunity to independently investigate, under faculty supervision, aspects of the field of computer engineering that are not sufficiently covered in existing courses. Proposals for independent study activities must be approved by both the faculty member supervising the independent study and the department head. **Ind Study, Credits 1 - 4 (Fall, Spring)**

Electrical Engineering

EEEE-105

Freshman Practicum

EE Practicum provides an introduction to the practice of electrical engineering including understanding laboratory practice, identifying electronic components, operating electronic test and measurement instruments, prototyping electronic circuits, and generating and analyzing waveforms. Laboratory exercises introduce the student to new devices or technologies and an associated application or measurement technique. This hands-on lab course emphasizes experiential learning to introduce the student to electrical engineering design practices and tools used throughout the undergraduate electrical engineering program and their professional career. Laboratory exercises are conducted individually by students using their own breadboard and components in a test and measurement laboratory setting. Measurements and observations from the laboratory exercises are recorded and presented by the student to a lab instructor or teaching assistant. Documented results are uploaded for assessment. **Lab 1, Credits 1 (Fall, Spring)**

EEEE-105

Freshman Practicum

EE Practicum provides an introduction to the practice of electrical engineering including understanding laboratory practice, identifying electronic components, operating electronic test and measurement instruments, prototyping electronic circuits, and generating and analyzing waveforms. Laboratory exercises introduce the student to new devices or technologies and an associated application or measurement technique. This hands-on lab course emphasizes experiential learning to introduce the student to electrical engineering design practices and tools used throughout the undergraduate electrical engineering program and their professional career. Laboratory exercises are conducted individually by students using their own breadboard and components in a test and measurement laboratory setting. Measurements and observations from the laboratory exercises are recorded and presented by the student to a lab instructor or teaching assistant. Documented results are uploaded for assessment. **Lecture 1, Credits 1 (Fall, Spring)**

EEEE-120

Digital Systems I

This course introduces the student to the basic components and methodologies used in digital systems design. It is usually the student's first exposure to engineering design. The laboratory component consists of small design, implement, and debug projects. The complexity of these projects increases steadily throughout the term, starting with circuits of a few gates, until small systems containing several tens of gates and memory elements. Topics include: Boolean algebra, synthesis and analysis of combinational logic circuits, arithmetic circuits, memory elements, synthesis and analysis of sequential logic circuits, finite state machines, and data transfers. (This course is restricted to MCEE-BS, EEEE-BS and ENGRX-UND students.) **Lab 2, Credits 3 (Fall, Spring)**

EEEE-120

Digital Systems I

This course introduces the student to the basic components and methodologies used in digital systems design. It is usually the student's first exposure to engineering design. The laboratory component consists of small design, implement, and debug projects. The complexity of these projects increases steadily throughout the term, starting with circuits of a few gates, until small systems containing several tens of gates and memory elements. Topics include: Boolean algebra, synthesis and analysis of combinational logic circuits, arithmetic circuits, memory elements, synthesis and analysis of sequential logic circuits, finite state machines, and data transfers. (This course is restricted to MCEE-BS, EEEE-BS and ENGRX-UND students.) **Lecture 3, Credits 3 (Fall, Spring)**

EEEE-220

Digital Systems II

In the first part, the course covers the design of digital systems using a hardware description language. In the second part, it covers the design of large digital systems using the computer design methodology, and culminates with the design of a reduced instruction set central processing unit, associated memory and input/output peripherals. The course focuses on the design, capture, simulation, and verification of major hardware components such as: the datapath, the control unit, the central processing unit, the system memory, and the I/O modules. The lab sessions enforce and complement the concepts and design principles exposed in the lecture through the use of CAD tools and emulation in a commercial FPGA. This course assumes a background in C programming. (Prerequisites: (EEEE-120 or 0306-341) and CMPR-271 or equivalent courses.) **Lab 2, Credits 3 (Fall, Spring)**

EEEE-220

Digital Systems II

In the first part, the course covers the design of digital systems using a hardware description language. In the second part, it covers the design of large digital systems using the computer design methodology, and culminates with the design of a reduced instruction set central processing unit, associated memory and input/output peripherals. The course focuses on the design, capture, simulation, and verification of major hardware components such as: the datapath, the control unit, the central processing unit, the system memory, and the I/O modules. The lab sessions enforce and complement the concepts and design principles exposed in the lecture through the use of CAD tools and emulation in a commercial FPGA. This course assumes a background in C programming. (Prerequisites: (EEEE-120 or 0306-341) and CMPR-271 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

EEEE-221

Clean and Renewable Energy Systems and Sources

This course covers the first principles and fundamentals of clean and renewable energy systems and sources. Various quantum-mechanical and electromagnetic devices and systems will be analyzed, designed and examined using software and CAD tools. Topics include: geothermal, hydro, nuclear, solar, wind, and other energy sources. Societal, ethical, economical, and environmental aspects of nanotechnology-enabled clean energy and power are also discussed. (Corequisite: PHYS-212 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

EEEE-222

Introduction to Wireless Communication

This course provides an introduction to the broad field of Wireless Communications and its applications. The course covers fundamental concepts from a systems perspective and familiarizes students with modern systems, applications and standards enabled by wireless communications. The course starts with an overview of the history of wireless communications and challenges in providing a reliable wireless data link. Afterwards, tools for link budget analysis and design are learned and applied to practical scenarios. Assessment of reliability follows using bit error rate curves and outage analysis. The course then diverges to address location based services (GPS), cellular telephony (CDMA and GSM networks), remote internet access (WiFi, LTE, WiMAX), standards for consumer electronics (Bluetooth, Zigbee), Wireless LAN, and sensor networks and their applications for environmental monitoring and medical services. **Lecture 3, Credits 3 (Spring)**

EEEE-255

Foundations of Circuits and Electronics

This course covers the fundamentals of DC and AC circuit analysis starting with the definition of voltage, current, resistance, power, and energy. Linearity and superposition, together with Kirchhoff's laws, are applied to analysis of circuits having series, parallel, and other combinations of circuit elements. Thevenin and maximum power transfer theorems are proved and applied. The complex plane and complex algebra are introduced along with the concepts of complex exponential functions, Phasors, complex impedances and admittances. Semiconductor diodes and diode circuits, including rectifying and clamping circuits as well as Zener diode-based voltage regulation, are introduced. Ideal operational amplifier circuits in non-inverting and inverting configurations and the design of analog integrated circuits using op amps are covered. Other topics include: transfer functions and frequency responses of RLC circuits, analog filter design, basic MOSFET current-voltage characteristics, DC and AC analysis of transistor circuits, and the design of single stage amplifiers. (Enrollment in this course requires permission from the department offering the course.) **Lecture 3, Credits 3 (Fall)**

EEEE-260**Introduction to Semiconductor Devices**

An introductory course on the fundamentals of semiconductor physics and principles of operation of basic devices. Topics include semiconductor fundamentals (crystal structure, statistical physics of carrier concentration, motion in crystals, energy band models, drift and diffusion currents) as well as the operation of pn junction diodes, bipolar junction transistors (BJT), metal-oxide-semiconductor (MOS) capacitors and MOS field-effect transistors. (Prerequisites: PHYS-212 or PHYS-208 and 209 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

EEEE-281**Circuits I**

Covers basics of DC circuit analysis starting with the definition of voltage, current, resistance, power and energy. Linearity and superposition, together with Kirchhoff's laws, are applied to analysis of circuits having series, parallel and other combinations of circuit elements. Thevenin, Norton and maximum power transfer theorems are proved and applied. Circuits with ideal op-amps are introduced. Inductance and capacitance are introduced and the transient response of RL, RC and RLC circuits to step inputs is established. Practical aspects of the properties of passive devices and batteries are discussed, as are the characteristics of battery-powered circuitry. The laboratory component incorporates use of both computer and manually controlled instrumentation including power supplies, signal generators and oscilloscopes to reinforce concepts discussed in class as well as circuit design and simulation software. (Prerequisite: MATH-173 or MATH-182 or MATH-182A or equivalent course.) **Lab 3, Credits 3 (Fall, Spring, Summer)**

EEEE-281**Circuits I**

Covers basics of DC circuit analysis starting with the definition of voltage, current, resistance, power and energy. Linearity and superposition, together with Kirchhoff's laws, are applied to analysis of circuits having series, parallel and other combinations of circuit elements. Thevenin, Norton and maximum power transfer theorems are proved and applied. Circuits with ideal op-amps are introduced. Inductance and capacitance are introduced and the transient response of RL, RC and RLC circuits to step inputs is established. Practical aspects of the properties of passive devices and batteries are discussed, as are the characteristics of battery-powered circuitry. The laboratory component incorporates use of both computer and manually controlled instrumentation including power supplies, signal generators and oscilloscopes to reinforce concepts discussed in class as well as circuit design and simulation software. (Prerequisite: MATH-173 or MATH-182 or MATH-182A or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

EEEE-282**Circuits II**

This course covers the fundamentals of AC circuit analysis starting with the study of sinusoidal steady-state solutions for circuits in the time domain. The complex plane is introduced along with the concepts of complex exponential functions, phasors, impedances and admittances. Nodal, loop and mesh methods of analysis as well as Thevenin and related theorems are applied to the complex plane. The concept of complex power is developed. The analysis of mutual inductance as applied to coupled-coils. Linear, ideal and non-ideal transformers are introduced. Complex frequency analysis is introduced to enable discussion of transfer functions, frequency dependent behavior, Bode plots, resonance phenomenon and simple filter circuits. Two-port network theory is developed and applied to circuits and interconnections. (Prerequisites: C or better in EEEE-281 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

EEEE-321**Energy Conversion**

This course covers: 1) the first principles and fundamentals of energy conversion: 2) The fundamentals of electromechanical, related electromagnetic topics, electric variables and electromagnetic forces. The basic concepts of energy conversion systems, DC electric machines, induction & synchronous electric machines (motors & generators) used in power systems, automotive, industrial, robotics and other applications are presented. The theory of energy conversion and electromechanical motion devices are covered. (Prerequisites: EEEE-282 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

EEEE-346**Advanced Programming**

This course teaches students to master C++ programming in solving engineering problems and introduces students to basic concepts of object-oriented programming. Advanced skills of applying pointers will be emphasized throughout the course so as to improve the portability and efficiency of the programs. Advanced skills of preprocessors, generic functions, linked list, and the use of Standard Template Library will be developed. (Prerequisites: CMPR-271 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

EEEE-353**Linear Systems**

Linear Systems provides the foundations of continuous and discrete signal and system analysis and modeling. Topics include a description of continuous linear systems via differential equations, a description of discrete systems via difference equations, input-output relationship of continuous and discrete linear systems, the continuous time convolution integral, the discrete time convolution sum, application of convolution principles to system response calculations, exponential and trigonometric forms of Fourier series and their properties, Fourier transforms including energy spectrum and energy spectral density. Sampling of continuous time signals and the sampling theorem, the Laplace, Z and DTFT. The solution of differential equations and circuit analysis problems using Laplace transforms, transfer functions of physical systems, block diagram algebra and transfer function realization is also covered. A comprehensive study of the z transform and its inverse, which includes system transfer function concepts, system frequency response and its interpretation, and the relationship of the z transform to the Fourier and Laplace transform is also covered. Finally, an introduction to the design of digital filters, which includes filter block diagrams for Finite Impulse Response (FIR) and Infinite Impulse Response (IIR) filters is introduced. (Prerequisites: EEEE-282 and MATH-231 and CMPR-271 or equivalent course.) **Lecture 4, Credits 4 (Fall, Spring)**

EEEE-374**EM Fields and Transmission Lines**

The course provides the foundations of EM fields, static and time varying, and a study of propagation, reflection and transmissions of electromagnetic waves in unbounded regions and in transmission lines. Topics include the following: electric field intensity and potential, Gauss' Law, polarization, electric flux density, dielectric constant and boundary conditions, Poisson's and Laplace's equations, methods of images, steady electric current and conduction current density, vector magnetic potential, Biot-Savart law, magnetization, magnetic field intensity, permeability, boundary conditions, Faraday's law, Maxwell's equations and the continuity equation. Time harmonic EM fields, wave equations, uniform plane waves, polarization, Poynting theorem and power, reflection and transmission from multiple dielectric interfaces, transmission line equations, transients on transmission lines, pulse and step excitations, reflection diagrams, sinusoidal steady state solutions, standing waves, the Smith Chart and impedance matching techniques, TE and TM waves in rectangular waveguides. experiments using state-of-art RF equipment illustrating fundamental wave propagation and reflection concepts, design projects with state-of-art EM modeling tools. (Prerequisites: MATH-221 and MATH-231 and PHYS-212 or PHYS-208 and PHYS-209 or equivalent course.) **Lab 3, Credits 4 (Fall, Spring)**

EEEE-374**EM Fields and Transmission Lines**

The course provides the foundations of EM fields, static and time varying, and a study of propagation, reflection and transmissions of electromagnetic waves in unbounded regions and in transmission lines. Topics include the following: electric field intensity and potential, Gauss' Law, polarization, electric flux density, dielectric constant and boundary conditions, Poisson's and Laplace's equations, methods of images, steady electric current and conduction current density, vector magnetic potential, Biot-Savart law, magnetization, magnetic field intensity, permeability, boundary conditions, Faraday's law, Maxwell's equations and the continuity equation. Time harmonic EM fields, wave equations, uniform plane waves, polarization, Poynting theorem and power, reflection and transmission from multiple dielectric interfaces, transmission line equations, transients on transmission lines, pulse and step excitations, reflection diagrams, sinusoidal steady state solutions, standing waves, the Smith Chart and impedance matching techniques, TE and TM waves in rectangular waveguides. experiments using state-of-art RF equipment illustrating fundamental wave propagation and reflection concepts, design projects with state-of-art EM modeling tools. (Prerequisites: MATH-221 and MATH-231 and PHYS-212 or PHYS-208 and PHYS-209 or equivalent course.) **Lecture 4, Credits 4 (Fall, Spring)**

EEEE-380**Digital Electronics**

This is an introductory course in digital MOS circuit analysis and design. The course covers the following topics: (1) MOSFET I-V behavior in aggressively scaled devices; (2) Static and dynamic characteristics of NMOS and CMOS inverters; (3) Combinational and sequential logic networks using CMOS technology; (4) Dynamic CMOS logic networks, including precharge-evaluate, domino and transmission gate circuits; (5) Special topics, including static and dynamic MOS memory, and interconnect RLC behavior. (Prerequisites: EEEE-281 or equivalent course.) **Lab 3, Credits 3 (Fall, Spring, Summer)**

EEEE-380**Digital Electronics**

This is an introductory course in digital MOS circuit analysis and design. The course covers the following topics: (1) MOSFET I-V behavior in aggressively scaled devices; (2) Static and dynamic characteristics of NMOS and CMOS inverters; (3) Combinational and sequential logic networks using CMOS technology; (4) Dynamic CMOS logic networks, including precharge-evaluate, domino and transmission gate circuits; (5) Special topics, including static and dynamic MOS memory, and interconnect RLC behavior. (Prerequisites: EEEE-281 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

EEEE-381

Electronics I

This is the first course in a two-course sequence in analog electronic circuit design. The course covers the following topics: (1) Basic MOSFET current-voltage characteristics; (2) DC and small-signal analysis and design of Metal-oxide-semiconductor (MOS) devices and circuits, including single-stage MOS amplifier configurations; (3) DC biasing circuits, such as basic current sources and current mirrors; (4) Two-transistor amplifier stages, such as differential amplifiers, cascode amplifiers, and output stages; (5) Analysis and design of multistage amplifiers; (6) Frequency response of single and multistage amplifiers; (7) Semiconductor diodes and diode circuits, including rectifying and clamping circuits, as well as Zener diode-based voltage regulation; (8) Ideal operational amplifier (op amp) circuits in non-inverting and inverting configurations. (Prerequisites: EEEE-281 or equivalent course or students in the CMPE-BS program.) **Lab 3, Credits 3 (Fall, Spring, Summer)**

EEEE-381

Electronics I

This is the first course in a two-course sequence in analog electronic circuit design. The course covers the following topics: (1) Basic MOSFET current-voltage characteristics; (2) DC and small-signal analysis and design of Metal-oxide-semiconductor (MOS) devices and circuits, including single-stage MOS amplifier configurations; (3) DC biasing circuits, such as basic current sources and current mirrors; (4) Two-transistor amplifier stages, such as differential amplifiers, cascode amplifiers, and output stages; (5) Analysis and design of multistage amplifiers; (6) Frequency response of single and multistage amplifiers; (7) Semiconductor diodes and diode circuits, including rectifying and clamping circuits, as well as Zener diode-based voltage regulation; (8) Ideal operational amplifier (op amp) circuits in non-inverting and inverting configurations. (Prerequisites: EEEE-281 or equivalent course or students in the CMPE-BS program.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

EEEE-414

Classical Control

This course introduces students to the study of linear continuous-time classical control systems, their behavior, design, and use in augmenting engineering system performance. The course is based on classical control methods using Laplace-transforms, block-diagrams, root-locus, and frequency-domain analysis. Topics include: Laplace-transform review; Bode plot review; system modeling for control; relationships of transfer-function poles and zeros to time-response behaviors; stability analysis; steady-state error, error constants, and error specification; feedback control properties; relationships between stability margins and transient behavior; lead, lag, and PID control; root-locus analysis and design; frequency-response design and Nyquist stability. A laboratory will provide students with hands-on analysis and design-build-test experience, and includes the use of computer-aided design software such as MATLAB. (Prerequisites: EEEE-353 or equivalent course.) **Lab 3, Credits 3 (Fall, Spring)**

EEEE-414

Classical Control

This course introduces students to the study of linear continuous-time classical control systems, their behavior, design, and use in augmenting engineering system performance. The course is based on classical control methods using Laplace-transforms, block-diagrams, root-locus, and frequency-domain analysis. Topics include: Laplace-transform review; Bode plot review; system modeling for control; relationships of transfer-function poles and zeros to time-response behaviors; stability analysis; steady-state error, error constants, and error specification; feedback control properties; relationships between stability margins and transient behavior; lead, lag, and PID control; root-locus analysis and design; frequency-response design and Nyquist stability. A laboratory will provide students with hands-on analysis and design-build-test experience, and includes the use of computer-aided design software such as MATLAB. (Prerequisites: EEEE-353 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

EEEE-420

Embedded Systems Design

The purpose of this course is to expose students to both the hardware and the software components of a digital embedded system. It focuses on the boundary between hardware and software operations. The elements of microcomputer architecture are presented, including a detailed discussion of the memory, input-output, the central processing unit (CPU) and the busses over which they communicate. C and assembly language level programming concepts are introduced, with an emphasis on the manipulation of microcomputer system elements through software means. Efficient methods for designing and developing C and assembly language programs are presented. Concepts of program controlled input and output are studied in detail and reinforced with extensive hands-on lab exercises involving both software and hardware, hands-on experience. (Prerequisites: EEEE-220 or equivalent course.) **Lab 3, Credits 3 (Fall, Spring)**

EEEE-420

Embedded Systems Design

The purpose of this course is to expose students to both the hardware and the software components of a digital embedded system. It focuses on the boundary between hardware and software operations. The elements of microcomputer architecture are presented, including a detailed discussion of the memory, input-output, the central processing unit (CPU) and the busses over which they communicate. C and assembly language level programming concepts are introduced, with an emphasis on the manipulation of microcomputer system elements through software means. Efficient methods for designing and developing C and assembly language programs are presented. Concepts of program controlled input and output are studied in detail and reinforced with extensive hands-on lab exercises involving both software and hardware, hands-on experience. (Prerequisites: EEEE-220 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

EEEE-447

Introduction to Artificial Intelligence

The courses will introduce Artificial Intelligence and Machine Learning topics with practical examples of data, tools, and algorithms. In addition to C, C++, and Matlab, a scripting language (i.e. Python) will be used and taught throughout the course. The course will explore basic artificial intelligence techniques and their applications to engineering problems. Students will be introduced to the following AI foundations: probability and linear algebra, state spaces, algorithms, data processing, feature extraction, feature reduction, classification, and decision making. Some of the techniques and tools to be covered in this course are inference, regression, linear discriminant analysis, decision trees, neural networks, deep learning platforms and architectures, and reinforcement learning. Students are expected to have any of the following programming skills: C/C++, Matlab, Java, or any other high level programming language. (Prerequisites: CMPR-271 and EEEE-346 or equivalent courses.) **Lab 2, Credits 3 (Fall)**

EEEE-447

Introduction to Artificial Intelligence

The courses will introduce Artificial Intelligence and Machine Learning topics with practical examples of data, tools, and algorithms. In addition to C, C++, and Matlab, a scripting language (i.e. Python) will be used and taught throughout the course. The course will explore basic artificial intelligence techniques and their applications to engineering problems. Students will be introduced to the following AI foundations: probability and linear algebra, state spaces, algorithms, data processing, feature extraction, feature reduction, classification, and decision making. Some of the techniques and tools to be covered in this course are inference, regression, linear discriminant analysis, decision trees, neural networks, deep learning platforms and architectures, and reinforcement learning. Students are expected to have any of the following programming skills: C/C++, Matlab, Java, or any other high level programming language. (Prerequisites: CMPR-271 and EEEE-346 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

EEEE-450

Analog Electronics

This is an introductory course in analog electronic circuit analysis and design. The course covers the following topics: (1) Diode circuit DC and small-signal behavior, including rectifying as well as Zener-diode-based voltage regulation; (2) MOSFET current-voltage characteristics; (3) DC biasing of MOSFET circuits, including integrated-circuit current sources; (4) Small-signal analysis of single-transistor MOSFET amplifiers and differential amplifiers; (5) Multi-stage MOSFET amplifiers, such as cascade amplifiers, and operational amplifiers; (6) Frequency response of MOSFET-based single- and multi-stage amplifiers; (7) DC and small-signal analysis and design of bipolar junction transistor (BJT) devices and circuits; (8) Feedback and stability in MOSFET and BJT amplifiers. (Prerequisites: EEEE-281 and EEEE-282 and EEEE-499 or equivalent courses.) **Lab 3, Credits 4 (Fall, Spring)**

EEEE-450

Analog Electronics

This is an introductory course in analog electronic circuit analysis and design. The course covers the following topics: (1) Diode circuit DC and small-signal behavior, including rectifying as well as Zener-diode-based voltage regulation; (2) MOSFET current-voltage characteristics; (3) DC biasing of MOSFET circuits, including integrated-circuit current sources; (4) Small-signal analysis of single-transistor MOSFET amplifiers and differential amplifiers; (5) Multi-stage MOSFET amplifiers, such as cascade amplifiers, and operational amplifiers; (6) Frequency response of MOSFET-based single- and multi-stage amplifiers; (7) DC and small-signal analysis and design of bipolar junction transistor (BJT) devices and circuits; (8) Feedback and stability in MOSFET and BJT amplifiers. (Prerequisites: EEEE-281 and EEEE-282 and EEEE-499 or equivalent courses.) **Lecture 4, Credits 4 (Fall, Spring)**

EEEE-482**Electronics II**

This is the second course in a two-course sequence in analog and digital electronic circuit analysis and design. The analog portion of the course covers the following topics: (1) DC and small signal analysis and design of bipolar junction transistor (BJT) circuits; (2) BJT DC biasing circuits; (3) Simple and compound BJT amplifier stages; (4) Analysis and design of BJT multi-stage amplifiers and op-amps; (5) Frequency response of BJT-based single and multi-stage amplifiers; (6) Feedback and stability in BJT and MOSFET amplifiers. The digital portion of the course covers the essential concepts and applications of digital electronic circuits implemented in NMOS and CMOS technologies. Topics include the following: (7) static and dynamic behavior of NMOS and CMOS inverters; (8) combinational and sequential CMOS logic networks; (9) dynamic CMOS logic networks, including precharge-evaluate, domino and transmission gate techniques; (10) special topics, including static and dynamic MOS memory and low-power logic. (Prerequisites: EEEE-282 and EEEE-381 or EEEE-380 or equivalent courses.) **Lab 3, Credits 4 (Fall, Spring)**

EEEE-482**Electronics II**

This is the second course in a two-course sequence in analog and digital electronic circuit analysis and design. The analog portion of the course covers the following topics: (1) DC and small signal analysis and design of bipolar junction transistor (BJT) circuits; (2) BJT DC biasing circuits; (3) Simple and compound BJT amplifier stages; (4) Analysis and design of BJT multi-stage amplifiers and op-amps; (5) Frequency response of BJT-based single and multi-stage amplifiers; (6) Feedback and stability in BJT and MOSFET amplifiers. The digital portion of the course covers the essential concepts and applications of digital electronic circuits implemented in NMOS and CMOS technologies. Topics include the following: (7) static and dynamic behavior of NMOS and CMOS inverters; (8) combinational and sequential CMOS logic networks; (9) dynamic CMOS logic networks, including precharge-evaluate, domino and transmission gate techniques; (10) special topics, including static and dynamic MOS memory and low-power logic. (Prerequisites: EEEE-282 and EEEE-381 or EEEE-380 or equivalent courses.) **Lecture 4, Credits 4 (Fall, Spring)**

EEEE-483**Mechatronics**

Fundamental principles of electric machines are covered. Sensors and actuators are studied. The primary actuators discussed are high-performance electromechanical motion devices such as permanent-magnet DC, synchronous and stepper motors. Topics in power electronics and control of electromechanical systems are studied. High-performance MATLAB environment is used to simulate, analyze and control mechatronic systems. Application of digital signal processors and microcontrollers in mechatronics are introduced. Case studies are covered. (Prerequisites: EEEE-374 and EEEE-414 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

EEEE-484**Communication Systems**

Introduction to Communication Systems provides the basics of the formation, transmission and reception of information over communication channels. Spectral density and correlation descriptions for deterministic and stationary random signals. Amplitude and angle modulation methods (e.g. AM and FM) for continuous signals. Carrier detection and synchronization. Phase-locked loop and its application. Introduction to digital communication. Binary ASK, FSK and PSK. Noise effects. Optimum detection: matched filters, maximum-likelihood reception. Computer simulation. (Prerequisites: EEEE-353 and (MATH-251 or 1016-345) or equivalent course.) **Lab 3, Credits 3 (Fall, Spring)**

EEEE-484**Communication Systems**

Introduction to Communication Systems provides the basics of the formation, transmission and reception of information over communication channels. Spectral density and correlation descriptions for deterministic and stationary random signals. Amplitude and angle modulation methods (e.g. AM and FM) for continuous signals. Carrier detection and synchronization. Phase-locked loop and its application. Introduction to digital communication. Binary ASK, FSK and PSK. Noise effects. Optimum detection: matched filters, maximum-likelihood reception. Computer simulation. (Prerequisites: EEEE-353 and (MATH-251 or 1016-345) or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

EEEE-485**Robotic Systems**

This course will cover basic electrical and mechanical engineering topics related to Robotics, including but not limited to: basic electrical and electronics components (resistors, capacitors, inductors, diodes, transistors, op-amps, timers) and concepts (sensors, signal conditioning, oscillators) and basic mechanical components (chains, gears, ratchets and pawl belt and chain drives, bearing) and concepts (motion, dynamics equations, and force and torque analysis). In addition, robotics system modeling, control, and applications will be explored. Students will design electronic interfaces and controllers for mechanical devices. Finally, sensor and actuator selection, installation, and application strategies will be explored. (Prerequisites: EEEE-346 or equivalent course.) **Lab 3, Credits 3 (Fall)**

EEEE-485**Robotic Systems**

This course will cover basic electrical and mechanical engineering topics related to Robotics, including but not limited to: basic electrical and electronics components (resistors, capacitors, inductors, diodes, transistors, op-amps, timers) and concepts (sensors, signal conditioning, oscillators) and basic mechanical components (chains, gears, ratchets and pawl belt and chain drives, bearing) and concepts (motion, dynamics equations, and force and torque analysis). In addition, robotics system modeling, control, and applications will be explored. Students will design electronic interfaces and controllers for mechanical devices. Finally, sensor and actuator selection, installation, and application strategies will be explored. (Prerequisites: EEEE-346 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

EEEE-489**Special Topics**

Topics and subject areas that are not among the courses listed here are frequently offered under the special topics title. Under the same title also may be found experimental courses that may be offered for the first time. Such courses are offered in a formal format; that is, regularly scheduled class sessions with an instructor. The level of complexity is commensurate with a senior-level undergraduate technical course. (Enrollment in this course requires permission from the department offering the course.) **Lecture 3, Credits 3 (Fall, Spring)**

EEEE-497**Multidisciplinary Senior Design I**

This is the first in a two-course sequence oriented to the solution of real-world engineering design problems. This is a capstone learning experience that integrates engineering theory, principles, and processes within a collaborative environment. Multidisciplinary student teams follow a systems engineering design process, which includes assessing customer needs, developing engineering specifications, generating and evaluating concepts, choosing an approach, developing the details of the design, and implementing the design to the extent feasible, for example by building and testing a prototype or implementing a chosen set of improvements to a process. This first course focuses primarily on defining the problem and developing the design, but may include elements of build/ implementation. The second course may include elements of design, but focuses on build/implementation and communicating information about the final design. (Prerequisites: EEEE-374 and EEEE-414 and EEEE-420 and EEEE-480 and two co-ops (EEEE-499).) **Lecture 3, Credits 3 (Fall, Spring)**

EEEE-498**Multidisciplinary Senior Design II**

This is the second in a two-course sequence oriented to the solution of real-world engineering design problems. This is a capstone learning experience that integrates engineering theory, principles, and processes within a collaborative environment. Multidisciplinary student teams follow a systems engineering design process, which includes assessing customer needs, developing engineering specifications, generating and evaluating concepts, choosing an approach, developing the details of the design, and implementing the design to the extent feasible, for example by building and testing a prototype or implementing a chosen set of improvements to a process. This first course focuses primarily on defining the problem and developing the design, but may include elements of build/implementation. The second course may include elements of design, but focuses on build/implementation and communicating information about the final design. (Prerequisites: EEEE-497 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

EEEE-499**Co-op**

One semester of paid work experience in electrical engineering. (This course is restricted to EEEE-BS Major students.) **CO OP, Credits 0 (Fall, Spring, Summer)**

EEEE-505**Modern Optics for Engineers**

This course provides a broad overview of modern optics in preparation for more advanced courses in the rapidly developing fields of optical fiber communications, image processing, super-resolution imaging, optical properties of materials, and novel optical materials. Topics covered: geometrical optics, propagation of light, diffraction, interferometry, Fourier optics, optical properties of materials, polarization and liquid crystals, and fiber optics. In all topics, light will be viewed as signals that carry information (data) in the time or spatial domain. After taking this course, the students should have a firm foundation in classical optics. (Prerequisites: EEEE-374 or equivalent course and not in EEEE-BS/MS program. Students in EEEE-BS/MS must take 600 or 700 level course. EEEE-374 Pre +not EEEE-BS/MS.) **Lecture 3, Credits 3 (Spring)**

EEEE-510**Analog Electronics Design**

This is a foundation course in analog integrated electronic circuit design and is a prerequisite for the graduate courses in analog integrated circuit design EEEE-726 and EEEE-730. The course covers the following topics: (1) CMOS Technology (2) CMOS active and passive element models (3) Noise mechanisms and circuit noise analysis (4) Current mirrors (5) Differential amplifiers, cascode amplifiers (6) Multistage amps and common mode feedback (7) Stability analysis of feedback amplifiers; (8) Advanced current mirrors, amplifiers, and comparators (9) Band gap and translinear cells (10) Matching. (Prerequisites: EEEE-480 or equivalent course and not in EEEE-BS/MS program.) **Lecture 3, Credits 3 (Fall)**

EEEE-512 **Advanced Semiconductor Devices**
This is an advanced undergraduate course in semiconductor electronics and device physics. The course covers the following topics: (1) Bipolar junction transistor (BJT) fundamentals; (2) Advanced BJT topics; (3) Metal-oxide-semiconductor field-effect transistor (MOSFET) fundamentals; (4) Advanced MOSFET topics. (Prerequisites: EEEE-260 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

EEEE-515 **Embedded Systems for Mechatronics**
This course introduces the principles of Matlab, Simulink and Embedded Systems through the use of examples, problems, and a hands-on learning approach. Matlab topics include: Matlab basic function usage, matrix manipulation, polynomials, programming loops, operators, logical operations, conditional flow control, m-files, data import/export, plotting, data analysis, custom functions, differential equation solvers, Fourier transforms, systems modeling, and introduction to external interfaces. Simulink topics include: creating a model file, basic block manipulation, interfacing with Matlab, modeling and solutions of systems, creating subsystems, S-functions, and custom blocks. This course introduces embedded systems programming with microprocessors focusing on measuring input, manipulating data, and controlling output. Several systems-level examples are presented. (Enrollment in this course requires permission from the department offering the course.) **Lecture 3, Credits 3 (Spring)**

EEEE-517 **Microwave Circuit Design**
The primary objective is to study the fundamentals of microwave engineering with emphasis on microwave network analysis and circuit design. Topics include microwave transmission lines such as wave-guides, coax, microstrip and stripline, microwave circuit theory such as S-matrix, ABCD matrices, and even odd mode analysis, analysis and design of passive circuits and components, matching networks, microwave resonators and filters. Microwave circuit design will be performed using ANSYS Designer software. (Prerequisite: EEEE-374 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

EEEE-520 **Design of Digital Systems**
The purpose of this course is to expose students to complete, custom design of a CMOS digital system. It emphasizes equally analytical and CAD based design methodologies, starting at the highest level of abstraction (RTL, front-end)), and down to the physical implementation level (back-end). In the lab students learn how to capture a design using both schematic and hardware description languages, how to synthesize a design, and how to custom layout a design. Testing, debugging, and verification strategies are formally introduced in the lecture, and practically applied in the lab projects. (Prerequisites: EEEE-420 and EEEE-480 or equivalent courses and not in EEEE-BS/MS program. Students in EEEE-BS/MS must take 600 or 700 level course.) **Lab 3, Credits 3 (Fall, Spring)**

EEEE-520 **Design of Digital Systems**
The purpose of this course is to expose students to complete, custom design of a CMOS digital system. It emphasizes equally analytical and CAD based design methodologies, starting at the highest level of abstraction (RTL, front-end)), and down to the physical implementation level (back-end). In the lab students learn how to capture a design using both schematic and hardware description languages, how to synthesize a design, and how to custom layout a design. Testing, debugging, and verification strategies are formally introduced in the lecture, and practically applied in the lab projects. (Prerequisites: EEEE-420 and EEEE-480 or equivalent courses and not in EEEE-BS/MS program. Students in EEEE-BS/MS must take 600 or 700 level course.) **Lecture 3, Credits 3 (Fall, Spring)**

EEEE-521 **Design of Computer Systems**
The purpose of this course is to expose students to the design of single and multicore computer systems. The lectures cover the design principles of instructions set architectures, non-pipelined data paths, control unit, pipelined data paths, hierarchical memory (cache), and multicore processors. The design constraints and the interdependencies of computer systems building blocks are being presented. The operation of single core, multicore, vector, VLIW, and EPIC processors is explained. In the first half of the semester, the lab projects enforce the material presented in the lectures through the design and physical emulation of a pipelined, single core processor. This is then being used in the second half of the semester to create a multicore computer system. The importance of hardware & software co-design is emphasized throughout the course. (Prerequisites: EEEE-420 or equivalent course.) **Lab 2, Credits 3 (Fall)**

EEEE-521 **Design of Computer Systems**
The purpose of this course is to expose students to the design of single and multicore computer systems. The lectures cover the design principles of instructions set architectures, non-pipelined data paths, control unit, pipelined data paths, hierarchical memory (cache), and multicore processors. The design constraints and the interdependencies of computer systems building blocks are being presented. The operation of single core, multicore, vector, VLIW, and EPIC processors is explained. In the first half of the semester, the lab projects enforce the material presented in the lectures through the design and physical emulation of a pipelined, single core processor. This is then being used in the second half of the semester to create a multicore computer system. The importance of hardware & software co-design is emphasized throughout the course. (Prerequisites: EEEE-420 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

EEEE-522 **Electric Power Transmission and Distribution**
This course deals with the topics related to electric power transmission and distribution. Topics covered in this course include: Three Phase System – Wye and Delta connections, Transformers – equivalent circuit – performance characteristics, Balanced and Unbalanced System Analysis, Transmission and Distribution Line Design Considerations, Transmission Line Protection, Transmission Line Faults and Fault Analysis. (Prerequisites: EEEE-321 or equivalent course and not in EEEE-BS/MS program. Students in EEEE-BS/MS must take 600 or 700 level course.) **Lecture 3, Credits 3 (Spring)**

EEEE-524 **Advances in Power Systems**
This course will introduce the details of electric power markets and the techniques to better use the available resources. Topics include the description of steam generation and renewable energy sources. Formulation of the cost associated with the generation and the optimization methods to minimize this cost in the economic dispatch problem. Unit commitment. Optimal power flow formulation and its solution methods. Introduction to smart grid technologies and challenges. (Students in EEEE-BS/MS must take 600 or 700 level course not 500 level course.) **Lecture 3, Credits 3 (Spring)**

EEEE-525 **Lab Applications in Mechatronics**
This course provides a culminating experience for the mechatronics engineering certificate, relying upon the completed course work and culminating in development of laboratory experiences related to mechatronics. Students enrolled in the course will design and prepare a novel lab experiment and complete lab experiments created by peers. (Prerequisites: EEEE-451 or equivalent course.) **Lab 1, Credits 2 (Spring)**

EEEE-525 **Lab Applications in Mechatronics**
This course provides a culminating experience for the mechatronics engineering certificate, relying upon the completed course work and culminating in development of laboratory experiences related to mechatronics. Students enrolled in the course will design and prepare a novel lab experiment and complete lab experiments created by peers. (Prerequisites: EEEE-451 or equivalent course.) **Lecture 2, Credits 2 (Spring)**

EEEE-529 **Antenna Theory**
The primary objective is to study the fundamental principles of antenna theory applied to the analysis and design of antenna elements and arrays including synthesis techniques and matching techniques. Topics include antenna parameters, linear antennas, array theory, wire antennas, microstrip antennas, antenna synthesis, aperture antennas and reflector antennas. The course involves design projects using some commercial EM software such as ANSYS HFSS. Measurement techniques for antenna input and radiation characteristics will be discussed and illustrated with the use of network analyzers, and spectrum analyzers in an anechoic chamber. (Prerequisite: EEEE-374 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

EEEE-530 **Biomedical Instrumentation**
Study of fundamental principles of electronic instrumentation and design consideration associated with biomedical measurements and monitoring. Topics to be covered include biomedical signals and transducer principles, instrumentation system fundamentals and electrical safety considerations, amplifier circuits and design for analog signal processing and conditioning of physiological voltages and currents as well as basic data conversion and processing technology. Laboratory experiments involving instrumentation circuit design and test will be conducted. (Prerequisite: EEEE-380 or EEEE-381 or equivalent course.Co-requisite: EEEE-480 or equivalent course.) **Lab 3, Credits 3 (Spring)**

EEEE-530 **Biomedical Instrumentation**
Study of fundamental principles of electronic instrumentation and design consideration associated with biomedical measurements and monitoring. Topics to be covered include biomedical signals and transducer principles, instrumentation system fundamentals and electrical safety considerations, amplifier circuits and design for analog signal processing and conditioning of physiological voltages and currents as well as basic data conversion and processing technology. Laboratory experiments involving instrumentation circuit design and test will be conducted. (Prerequisite: EEEE-380 or EEEE-381 or equivalent course.Co-requisite: EEEE-480 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

EEEE-531 **Biomedical Sensors and Transducers I**
Biological entities represent one of the most difficult environments in which to obtain or generate accurate and reliable signals. This course will discuss the techniques, mechanisms and methods necessary to transfer accurate and reliable information or signals with a biological target. Various biomedical sensor and transducer types including their characteristics, advantages, disadvantages and signal conditioning will be covered. Discussions will include the challenges associated with providing a reliable and reproducible interface to a biological entity, the nature and characteristics of the associated signals, the types of applicable sensors and transducers and the circuitry necessary to drive them. (Prerequisites: EEEE-480 and EEEE-353 or equivalent course.) **Lab 2, Credits 3 (Fall)**

EEEE-531**Biomedical Sensors and Transducers I**

Biological entities represent one of the most difficult environments in which to obtain or generate accurate and reliable signals. This course will discuss the techniques, mechanisms and methods necessary to transfer accurate and reliable information or signals with a biological target. Various biomedical sensor and transducer types including their characteristics, advantages, disadvantages and signal conditioning will be covered. Discussions will include the challenges associated with providing a reliable and reproducible interface to a biological entity, the nature and characteristics of the associated signals, the types of applicable sensors and transducers and the circuitry necessary to drive them. (Prerequisites: EEEE-480 and EEEE-353 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

EEEE-532**Fundamental Electrophysiology**

Investigation and study of the concepts and underlying mechanisms associated with electrical signals in mammalian biology and physiology with a significant emphasis on methods, techniques and understanding of electrical potential distribution and current flow derived from circuit analysis. Intended to provide engineers with insight into the relationship between the study of electricity and its applicability to a wide variety of physiological mechanisms ranging from intracellular communication and control to cognitive function and bodily movement. Successful completion of the course will require generation of a significantly in-depth analysis report on some electrophysiological phenomenon or mechanism. (Prerequisites: EEEE-281 and EEEE-374 and MEDS-251 or equivalent course.) **Lecture 4, Credits 3 (Spring)**

EEEE-533**Biomedical Signal Processing**

Discussion and study of the methods and techniques that may be optimally employed for the fixed and adaptive processing of information with biological and physiological origin. The challenges and unique features of these types of signals will be discussed and application of known signal processing techniques that accommodate linear, non-linear and stochastic signals for the purpose of analysis, detection and estimation, monitoring and control will be studied. Successful participation in the course will entail completion of a project involving incorporation of these techniques in a biomedical application. (Prerequisites: EEEE-353 or BIME-440 or equivalent courses and graduate student standing.) **Lec/Lab 3, Credits 3 (Spring)**

EEEE-536**Biorobotics/Cybernetics**

Cybernetics refers to the science of communication and control theory that is concerned especially with the comparative study of automatic control systems (as in the nervous system and brain and mechanical- electrical communications systems). This course will present material related to the study of cybernetics as well as the aspects of robotics and controls associated with applications of a biological nature. Topics will also include the study of various paradigms and computational methods that can be utilized to achieve the successful integration of robotic mechanisms in a biological setting. Successful participation in the course will entail completion of at least one project involving incorporation of these techniques in a biomedical application. (Students in EEEE-BS/MS must take 600 or 700 level course not 500 level course.) **Lab 2, Credits 3 (Spring)**

EEEE-536**Biorobotics/Cybernetics**

Cybernetics refers to the science of communication and control theory that is concerned especially with the comparative study of automatic control systems (as in the nervous system and brain and mechanical- electrical communications systems). This course will present material related to the study of cybernetics as well as the aspects of robotics and controls associated with applications of a biological nature. Topics will also include the study of various paradigms and computational methods that can be utilized to achieve the successful integration of robotic mechanisms in a biological setting. Successful participation in the course will entail completion of at least one project involving incorporation of these techniques in a biomedical application. (Students in EEEE-BS/MS must take 600 or 700 level course not 500 level course.) **Lecture 3, Credits 3 (Spring)**

EEEE-546**Power Electronics**

The course involves the study of the circuits and devices used in the control and conversion of power. Devices include diodes, BJTs, power MOSFETS, IGBTs and thyristors. Power conversion includes rectifiers (ac-dc), dc-dc, ac-ac and inverters (dc-ac). DC circuit topologies include Buck Converter, Boost Converter, Buck-Boost Converter, and the Cuk converter. (Prerequisites: EEEE-282 or equivalent course.) **Lab 2, Credits 3 (Spring)**

EEEE-546**Power Electronics**

The course involves the study of the circuits and devices used in the control and conversion of power. Devices include diodes, BJTs, power MOSFETS, IGBTs and thyristors. Power conversion includes rectifiers (ac-dc), dc-dc, ac-ac and inverters (dc-ac). DC circuit topologies include Buck Converter, Boost Converter, Buck-Boost Converter, and the Cuk converter. (Prerequisites: EEEE-282 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

EEEE-547**Artificial Intelligence Explorations**

The course will start with the history of artificial intelligence and its development over the years. There have been many attempts to define and generate artificial intelligence. As a result of these attempts, many artificial intelligence techniques have been developed and applied to solve real life problems. This course will explore variety of artificial intelligence techniques, and their applications and limitations. Some of the AI techniques to be covered in this course are intelligent agents, problem-solving, knowledge and reasoning, uncertainty, decision making, learning (Neural networks and Bayesian networks), reinforcement learning, swarm intelligence, Genetic algorithms, particle swarm optimization, applications in robotics, controls, and communications. Students are expected to have any of the following programming skills listed above. Students will write an IEEE conference paper. (Students in EEEE-BS/MS must take 600 or 700 level course not 500 level course.) **Lecture 3, Credits 3 (Fall)**

EEEE-579**Analog Filter Design**

A study of the various techniques for the design of filters to meet the given specifications. The emphasis is on the design of active filters using op amps. The following topics are discussed in detail: Review of transfer functions, Bode diagrams and the analysis of op amp circuits; ideal filter characteristics, approximations to the ideal filter using Butterworth, Chebyshev and Bessel-Thompson polynomials; standard filter stages; magnitude and frequency scaling; low-pass filter design; design of high-pass, band-pass and band-reject filters; passive ladder filter network design; frequency dependent negative resistance networks; switched capacitor filters. (Prerequisites: EEEE-480 and EEEE-353 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

EEEE-583**Mechatronics**

Fundamental principles of electromagnetic transducers are covered. Sensors and actuators are studied. Fundamental, applied and experimental studies and learning are focused on high-performance electromechanical motion devices, such as permanent-magnet DC, synchronous and stepper motors. Topics in power electronics and control of electromechanical systems are studied. High-performance MATLAB environment is used to simulate, analyze and control mechatronic systems. Applications of digital signal processors and microcontrollers in mechatronic systems are introduced. Case studies are covered. (Prerequisites: EEEE-353 or MECE-320 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

EEEE-585**Principles of Robotics**

An introduction to a wide range of robotics-related topics, including but not limited to sensors, interface design, robot devices applications, mobile robots, intelligent navigation, task planning, coordinate systems and positioning image processing, digital signal processing applications on robots, and controller circuitry design. Pre-requisite for the class is a basic understanding of signals and systems, matrix theory, and computer programming. Software assignments will be given to the students in robotic applications. Students will prepare a project, in which they will complete software or hardware design of an industrial or mobile robot. There will be a two-hour lab additional to the lectures. (Prerequisites: EEEE-353 or equivalent course and not in EEEE-BS/MS program. Students in EEEE-BS/MS must take 600 or 700 level course.) **Lab 3, Credits 3 (Fall)**

EEEE-585**Principles of Robotics**

An introduction to a wide range of robotics-related topics, including but not limited to sensors, interface design, robot devices applications, mobile robots, intelligent navigation, task planning, coordinate systems and positioning image processing, digital signal processing applications on robots, and controller circuitry design. Pre-requisite for the class is a basic understanding of signals and systems, matrix theory, and computer programming. Software assignments will be given to the students in robotic applications. Students will prepare a project, in which they will complete software or hardware design of an industrial or mobile robot. There will be a two-hour lab additional to the lectures. (Prerequisites: EEEE-353 or equivalent course and not in EEEE-BS/MS program. Students in EEEE-BS/MS must take 600 or 700 level course.) **Lecture 3, Credits 3 (Fall)**

EEEE-587**MEMS Evaluation**

This course focuses on evaluation of MEMS, microsystems and microelectromechanical motion devices utilizing MEMS testing and characterization. Evaluations are performed using performance evaluation matrices, comprehensive performance analysis and functionality. Applications of advanced software and hardware in MEMS evaluation will be covered. (Prerequisites: EEEE-260 and EEEE-480 or equivalent courses and not in EEEE-BS/MS program.) **Lecture 3, Credits 3 (Spring)**

EEEE-592**Communication Networks**

This course covers communication networks in general and the internet in particular. Topics include layers service models, circuit and packet switching, queuing, pipelining, routing, packet loss and more. A five-layer model is assumed and the top four levels are covered in a top-down approach: starting with the application layer, going down through the transport layer to the network layer and finally the data link layer. Emphasis is placed on wireless networks and network security. (Prerequisites: MATH-251 or equivalent course and not in EEEE-BS/MS program. Students in EEEE-BS/MS must take 600 or 700 level course.) **Lecture 3, Credits 3 (Spring)**

EEEE-593

Digital Data Communication

Principles and practices of modern digital data communication systems. Topics include pulse code transmission and error probabilities, M-ary signaling and performance, AWGN channels, band-limited and distorting channels, filter design, equalizers, optimal detection for channels with memory, synchronization methods, non-linear modulation, and introduction to multipath fading channels, spread spectrum and OFDM. (Prerequisites: EEEE-484 or equivalent course and not in EEEE-BS/MS program. Students in EEEE-BS/MS must take 600 or 700 level course.) **Lecture 3, Credits 3 (Spring)**

EEEE-594

Sensor Array Processing for Wireless Communications

This course offers a broad overview of sensor-array processing, with a focus on wireless communications. It aims at providing the students with essential and advanced theoretical and technical knowledge that finds direct application in modern wireless communication systems that employ multi-sensor arrays and/or apply user-multiplexing in the code domain (CDMA). Theory and practices covered in this course can be extended in fields such as radar, sonar, hyperspectral image processing, and biomedical signal processing. Topics covered: uniform linear antenna arrays (inter-element spacing and Nyquist sampling in space); linear beamforming, array beam patterns, array gain, and spatial diversity; interference suppression in the absence of noise (null-steering beamforming); optimal beamforming in AWGN (matched filter); optimal beamforming in the presence of colored interference; estimation of filters from finite measurements and adaptive beamforming (SMI and variants, RLS, LMS and variants, CMA, and AV); BPSK demodulation with antenna arrays (multiple users and AWGN); BPSK demodulation in CDMA (multiple users and AWGN); ML and subspace methods (MUSIC, root MUSIC, Minimum-norm, Linear Predictor, Pisarenko) for Direction-of-arrival estimation; BPSK demodulation with antenna arrays in CDMA systems (space-time processing). (Prerequisites: EEEE-484 or equivalent course and not in EEEE-BS/MS program. Students in EEEE-BS/MS must take 600 or 700 level course.) **Lecture 3, Credits 3 (Fall)**

EEEE-595

Optimization Methods for Engineers

This course is designed to help the interested engineering students to develop working knowledge of optimization and, specifically, to develop the skills and background needed to recognize, formulate, and solve convex optimization problems. Convex optimization problems emerge naturally in the design and analysis of systems across the entire engineering spectrum. First, the course will briefly review basic concepts of linear algebra and calculus. Second, students will be introduced to optimization (problem formulation, feasibility sets, etc.) and principles of convexity, including convex functions, convex sets, convex problems and properties thereof. Then, an array of algorithmic numerical methods will be studied for the solution of convex problems, covering, among other topics, gradient methods, coordinate descent, Lagrangian duality, saddle points, optimality conditions etc. Last, the course will focus on how to formulate and solve convex problems in engineering, including convex approximation of non-convex problems and regularization. Many practical application examples will be studied from diverse areas of engineering. Through a series of assignments and in-class examples, students will learn how to practically solve optimization problems in MATLAB, using state-of-the-art toolboxes. (Prerequisites: MATH-221 or MATH-221H or equivalent course.) **Lecture 3, Credits 3 (Fall)**

EEEE-599

Independent Study

A supervised investigation within an electrical engineering area of student interest. Professional elective. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**

General Engineering

EGEN-099

Engineering Co-op Preparation

This course will prepare students, who are entering their second year of study, for both the job search and employment in the field of engineering. Students will learn strategies for conducting a successful job search, including the preparation of resumes and cover letters; behavioral interviewing techniques and effective use of social media in the application process. Professional and ethical responsibilities during the job search and for co-op and subsequent professional experiences will be discussed. (This course is restricted to students in Kate Gleason College of Engineering with at least 2nd year standing.) **Lecture 1, Credits 0 (Fall, Spring)**

EGEN-100

Engineering Exploration Seminar

A one-credit hour seminar course for engineering exploration students that provides information to introduce the seven engineering programs offered at RIT. Program curricula, sample lab/project work, and various career opportunities pertaining to each major are presented. (This course is restricted to ENGRX-UND or UNIVST-UND Major students.) **Lecture 1, Credits 1 (Fall)**

EGEN-132

Product Innovation

The first course in a series of courses for engineering honors students focused on how innovative products are developed, designed and manufactured to effectively meet the expanding needs of a global economy. This one-credit hour seminar course focuses on the key elements associated with the process of concept creation; namely, how individuals identify promising ideas for new products and how these ideas are shaped and refined in ways that will optimize the product's success in the marketplace, from the perspective of customer demand. (This course is restricted to Undergraduate College of Engineering Honors students.) **Lecture 1, Credits 1 (Spring)**

EGEN-231

Manufacturing and Supply Chain

The second course in a series of three courses for engineering honors students focused on how innovative products are developed, designed and manufactured to effectively meet the expanding needs of a global economy. This course highlights key issues that decision-makers in industry need to understand as they shape their companies to be more competitive in a global context. Specific topics in the course include an in-depth discussion of the manufacturing supply chain and how active management of the supply chain can enhance profitability and customer satisfaction. Additionally, the course addresses issues such as the impact of government policies and monetary issues on globalization and outsourcing. (This course is restricted to Undergraduate College of Engineering Honors students.) **Lecture 1, Credits 1 (Fall)**

EGEN-232

Leadership/Ethics/Sustainability

The third course in a series of courses for engineering honors students focused on how innovative products are developed, designed and manufactured to effectively meet the expanding needs of a global economy. This course highlights key issues that decision-makers in industry need to understand as they shape their companies to be more competitive in a global context. A series of presentations by guest speakers address the topics of leadership, ethics, and sustainability. (This course is restricted to Undergraduate College of Engineering Honors students.) **Lecture 1, Credits 1 (Spring)**

EGEN-250

Grand Challenges in Engineering

Did you choose an engineering degree because you want to make a difference in the world? From protecting public health and the environment to improving education, security and wellbeing, humanity faces dire challenges as well as exciting opportunities to improve life in the 21st Century. This course will explore how engineers, working in concert with other disciplines, can play an important role in addressing such Grand Challenges and how RIT faculty and students are already making progress. You will learn how you too can start building a better future in the Grand Challenges Scholars Program even while you are still completing your undergraduate degree! Using the global initiatives of the National Academy of Engineering's 'Grand Challenges' Program and the United Nations Sustainable Development Goals for direction, the course seeks to broaden students' vision of technological problem solving, explore how engineers/scientists can participate in meeting key societal needs, and introduce some of the social and ethical questions that must also be considered. Seminars by campus and local experts will expose students to the challenges and the interdisciplinary approaches required to address them. Opportunities available on campus for students to meet the five Grand Challenges Competencies will be presented along with examples of work from graduating scholars. As part of the course, students will generate all the materials required for an application to the RIT Grand Challenges Scholars Program, and if they wish, they may submit them for consideration for program entry at the end of the course. **Seminar 3, Credits 1 (Summer)**

EGEN-495

Collaborative Community Capstone

In this alternative capstone project course, students from diverse disciplines work in collaboration with community partners on projects that are defined and supported by residents with community organizations in Rochester and around the world. Community organizations have extensive knowledge about their environment, passion for their work, power to make change in the lives of individuals and their community, and the ability to inspire others...but have not typically enjoyed as much access to the resources of Universities as industry and government. This course seeks to strengthen connections and build relationships between the University and community groups. Students receive team coaching from a Collaborative Community Capstone guide as well as advising from an expert in their discipline as they work on their project. The traditional capstone experiences of teamwork, planning, project management and application of disciplinary learning are supplemented by coaching around best practices for authentic community engagement that is sensitive to cultural, economic and power differentials, grows trusting relationships, and promotes project outcomes that support community wellbeing. In this course, students will gain strategies and confidence in working with diverse partners using democratic principles, consider the ethical and social implications of their civic participation and professional work, and join an inspirational team of people working together for a better world—all while completing their capstone requirements. Each semester the course will follow a Plan, Do, Check, Act, Reflect process. Students taking the course as an alternative to Multidisciplinary Senior Design will take the course twice, doing additional work on the same project. **Studio 6, Credits 3 (Fall, Spring)**

Industrial and Systems Engineering

ISEE-120

Fundamentals of Industrial Engineering

This course introduces students to industrial engineering and provides students with foundational tools used in the profession. The course is intended to prepare students for their first co-op experience in industrial engineering by exposing them to tools and concepts that are often encountered during early co-op assignments. The course covers specific tools and their applications, including systems design and the integration. The course uses a combination of lecture and laboratory activities. Projects and group exercises will be used to cover hands-on applications and problem-solving related to topics covered in lectures. (This class is restricted to ISEE-BS, ENGRX-UND, or ISEEDU Major students.) **Lecture 3, Credits 3 (Fall, Spring)**

ISEE-140

Materials Processing

A study of the application of machine tools and fabrication processes to engineering materials in the manufacture of products. Processes covered include cutting, molding, casting, forming, powder metallurgy, solid modeling, engineering drawing, and welding. Students make a project in the lab portion of the course. (This class is restricted to ISEE-BS, ENGRX-UND, or ISEEDU Major students.) **Lab 1, Credits 3 (Fall)**

ISEE-140

Materials Processing

A study of the application of machine tools and fabrication processes to engineering materials in the manufacture of products. Processes covered include cutting, molding, casting, forming, powder metallurgy, solid modeling, engineering drawing, and welding. Students make a project in the lab portion of the course. (This class is restricted to ISEE-BS, ENGRX-UND, or ISEEDU Major students.) **Lecture 3, Credits 3 (Fall)**

ISEE-200

Computing for Engineers

This course aims to help undergraduate students in understanding the latest software engineering techniques and their applications in the context of industrial and systems engineering. The topics of this course include the fundamental concepts and applications of computer programming, software engineering, computational problem solving, and statistical techniques for data mining and analytics. (This class is restricted to ISEE-BS, ENGRX-UND, or ISEEDU Major students.) **Lecture 3, Credits 3 (Spring)**

ISEE-301

Operations Research

An introduction to optimization through mathematical programming and stochastic modeling techniques. Course topics include linear programming, transportation and assignment algorithms, Markov Chain queuing and their application on problems in manufacturing, health care, financial systems, supply chain, and other engineering disciplines. Special attention is placed on sensitivity analysis and the need of optimization in decision-making. The course is delivered through lectures and a weekly laboratory where students learn to use state-of-the-art software packages for modeling large discrete optimization problems. (Prerequisites: MATH-233 or (MATH-231 and MATH-241) or equivalent course.) **Lab 2, Credits 4 (Spring)**

ISEE-301

Operations Research

An introduction to optimization through mathematical programming and stochastic modeling techniques. Course topics include linear programming, transportation and assignment algorithms, Markov Chain queuing and their application on problems in manufacturing, health care, financial systems, supply chain, and other engineering disciplines. Special attention is placed on sensitivity analysis and the need of optimization in decision-making. The course is delivered through lectures and a weekly laboratory where students learn to use state-of-the-art software packages for modeling large discrete optimization problems. (Prerequisites: MATH-233 or (MATH-231 and MATH-241) or equivalent course.) **Lecture 3, Credits 4 (Spring)**

ISEE-304

Fundamentals of Materials Science

This course provides the student with an overview of structure, properties, and processing of metals, polymers, ceramics and composites. There is a particular emphasis on understanding of materials and the relative impact on manufacturing optimization throughput and quality as it relates to Industrial Engineering. This course is delivered through lectures and a weekly laboratory. (This course is restricted to ISEE-BS Major students.) **Lab 2, Credits 3 (Spring)**

ISEE-304

Fundamentals of Materials Science

This course provides the student with an overview of structure, properties, and processing of metals, polymers, ceramics and composites. There is a particular emphasis on understanding of materials and the relative impact on manufacturing optimization throughput and quality as it relates to Industrial Engineering. This course is delivered through lectures and a weekly laboratory. (This course is restricted to ISEE-BS Major students.) **Lecture 2, Credits 3 (Spring)**

ISEE-323

Systems and Facilities Planning

A basic course in quantitative models on layout, material handling, and warehousing. Topics include product/process analysis, flow of materials, material handling systems, warehousing and layout design. A computer-aided layout design package is used. (Corequisites: ISEE-301 or equivalent course.) **Lab 2, Credits 3 (Spring)**

ISEE-323

Systems and Facilities Planning

A basic course in quantitative models on layout, material handling, and warehousing. Topics include product/process analysis, flow of materials, material handling systems, warehousing and layout design. A computer-aided layout design package is used. (Corequisites: ISEE-301 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

ISEE-325

Engineering Statistics and Design of Experiments

This course covers statistics for use in engineering as well as the primary concepts of experimental design. The first portion of the course will cover: Point estimation; hypothesis testing and confidence intervals; one- and two-sample inference. The remainder of the class will be spent on concepts of design and analysis of experiments. Lectures and assignments will incorporate real-world science and engineering examples, including studies found in the literature. (Prerequisites: STAT-251 or MATH-251 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

ISEE-330

Ergonomics and Human Factors

This course covers the physical and cognitive aspects of human performance to enable students to design work places, procedures, products and processes that are consistent with human capabilities and limitations. Principles of physical work and human anthropometry are studied to enable the student to systematically design work places, processes, and systems that are consistent with human capabilities and limitations. In addition, the human information processing capabilities are studied, which includes the human sensory, memory, attention and cognitive processes; display and control design principles; as well as human computer interface design. (Co-requisites: ISEE-325 or STAT-257 or MATH-252 or equivalent course.) **Lecture 4, Credits 4 (Spring)**

ISEE-345

Engineering Economy

Time value of money, methods of comparing alternatives, depreciation and depletion, income tax consideration and capital budgeting. Cannot be used as a professional elective for ISE majors. Course provides a foundation for engineers to effectively analyze engineering projects with respect to financial considerations. **Lecture 3, Credits 3 (Fall, Spring)**

ISEE-350

Engineering Management

Development of the fundamental engineering management principles of industrial enterprise, including an introduction to project management. Emphasis is on project management and the development of the project management plan. At least one term of previous co-op experience is required. (Prerequisite: BIME-499 or MECE-499 or ISEE-499 or CHME-499 or EEEE-499 or CMPE-499 or MCEE-499 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

ISEE-420

Production Planning/Scheduling

A first course in mathematical modeling of production-inventory systems. Topics included: Inventory: Deterministic Models, Inventory: Stochastic Models, Push v. Pull Production Control Systems, Factory Physics, and Operations Scheduling. Modern aspects such as lean manufacturing are included in the context of the course. (Prerequisites: ISEE-301 and (STAT-251 or MATH-251) or equivalent course.) **Lecture 3, Credits 3 (Fall)**

ISEE-421

Design and Analysis of Production Systems

This course will provide an introduction to concepts and techniques in the design and analysis of production systems. A blend of traditional and modern approaches is brought into the classroom. At the end of the semester, the student will be able to assess and analyze the performance of a given manufacturing system as well as to provide a framework for system redesign and improvement. Modern aspects such as lean manufacturing are included in the context of the course. (Corequisites: ISEE-420 or equivalent course.) **Lab 1, Credits 3 (Fall)**

ISEE-421

Design and Analysis of Production Systems

This course will provide an introduction to concepts and techniques in the design and analysis of production systems. A blend of traditional and modern approaches is brought into the classroom. At the end of the semester, the student will be able to assess and analyze the performance of a given manufacturing system as well as to provide a framework for system redesign and improvement. Modern aspects such as lean manufacturing are included in the context of the course. (Corequisites: ISEE-420 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

ISEE-489

Special Topics

Topics and subject areas that are not among the courses listed here are frequently offered under the special topics title. Under the same title also may be found experimental courses that may be offered for the first time. Such courses are offered in a formal format; that is, regularly scheduled class sessions with an instructor. The level of complexity is commensurate with a senior-level undergraduate technical course. **Lecture 3, Credits 3 (Fall, Spring)**

ISEE-497 **Multidisciplinary Senior Design I**
This is the first in a two-course sequence oriented to the solution of real world engineering design problems. This is a capstone learning experience that integrates engineering theory, principles, and processes within a collaborative environment. Multidisciplinary student teams follow a systems engineering design process, which includes assessing customer needs, developing engineering specifications, generating and evaluating concepts, choosing an approach, developing the details of the design, and implementing the design to the extent feasible, for example by building and testing a prototype or implementing a chosen set of improvements to a process. This first course focuses primarily on defining the problem and developing the design, but may include elements of build/ implementation. The second course may include elements of design, but focuses on build/implementation and communicating information about the final design. (Prerequisites: ISEE-323 and ISEE-330 or equivalent course.Co-requisites: ISEE-350 and ISEE-420 and ISEE-510 and ISEE-560 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

ISEE-498 **Multidisciplinary Senior Design II**
This is the second in a two-course sequence oriented to the solution of real world engineering design problems. This is a capstone learning experience that integrates engineering theory, principles, and processes within a collaborative environment. Multidisciplinary student teams follow a systems engineering design process, which includes assessing customer needs, developing engineering specifications, generating and evaluating concepts, choosing an approach, developing the details of the design, and implementing the design to the extent feasible, for example by building and testing a prototype or implementing a chosen set of improvements to a process. The first course focuses primarily on defining the problem and developing the design, but may include elements of build/ implementation. This second course may include elements of design, but focuses on build/implementation and communicating information about the final design. (Prerequisites: ISEE-497 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

ISEE-499 **Co-op**
One semester of paid work experience in industrial engineering. (Prerequisites: ISEE-120 and EGEN-99 and students in the ISEE-BS program.) **CO OP, Credits 0 (Fall, Spring, Summer)**

ISEE-510 **Systems Simulation**
Computer-based simulation of dynamic and stochastic systems. Simulation modeling and analysis methods are the focus of this course. A high-level simulation language such as Simio, ARENA, etc., will be used to model systems and examine system performance. Model validation, design of simulation experiments, and random number generation will be introduced. (Prerequisites: ISEE-200 and ISEE-301 or equivalent course.Co-requisites: ISEE-325 or STAT-257 or MATH-252 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

ISEE-560 **Applied Statistical Quality Control**
An applied approach to statistical quality control utilizing theoretical tools acquired in other math and statistics courses. Heavy emphasis on understanding and applying statistical analysis methods in real-world quality control situations in engineering. Topics include process capability analysis, acceptance sampling, hypothesis testing and control charts. Contemporary topics such as six-sigma are included within the context of the course. (Prerequisites: ISEE-325 or STAT-257 or MATH-252 or equivalent course and students in ISEE-BS or ISEE-MN or ENGMGT-MN programs.) **Lecture 3, Credits 3 (Fall)**

ISEE-561 **Linear Regression Analysis**
In any system where parameters of interest change, it may be of interest to examine the effects that some variables exert (or appear to exert) on others. "Regression analysis" actually describes a variety of data analysis techniques that can be used to describe the interrelationships among such variables. In this course we will examine in detail the use of one popular analytic technique: least squares linear regression. Cases illustrating the use of regression techniques in engineering applications will be developed and analyzed throughout the course. (Prerequisites: (MATH-233 or (MATH-231 and MATH-241)) and (ISEE-325 or STAT-257 or MATH-252) or equivalent courses and students in ISEE-BS programs.) **Lecture 3, Credits 3 (Fall)**

ISEE-582 **Lean Six Sigma Fundamentals**
This course presents the philosophy and methods that enable participants to develop quality strategies and drive process improvements. The fundamental elements of Lean Six Sigma are covered along with many problem solving and statistical tools that are valuable in driving process improvements in a broad range of business environments and industries. Successful completion of this course is accompanied by "yellow belt" certification and provides a solid foundation for those who also wish to pursue a "green belt." (Green belt certification requires completion of an approved project which is beyond the scope of this course). (Prerequisites: STAT-145 or STAT-251 or MATH-251 or CHME-391 or equivalent course and and at least 4th year standing.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

ISEE-589 **Special Topics**
Topics and subject areas that are not regularly offered are provided under this course. Such courses are offered in a normal format; that is, regularly scheduled class sessions with an instructor. **Lecture 3, Credits 3 (Fall, Spring)**

ISEE-599 **Independent Study**
A supervised investigation within an industrial engineering area of student interest. Professional elective. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 0 - 4 (Fall, Spring, Summer)**

Mechanical Engineering

MECE-102 **Engineering Mechanics Laboratory**
This course examines classical Newtonian mechanics from a calculus-based fundamental perspective with close coupling to integrated laboratory experiences. Topics include kinematics; Newton's laws of motion; work-energy theorem, and power; systems of particles and linear momentum; circular motion and rotation; mechanical waves, and oscillations and gravitation within the context of mechanical engineering, using mechanical engineering conventions and nomenclature. Each topic is reviewed in lecture, and then thoroughly studied in an accompanying laboratory session. Students conduct experiments using modern data acquisition technology; and analyze, interpret, and present the results using modern computer software. (Prerequisite: This class is restricted to MECE-BS or ENGRX-UND or MECEDU-BS students. Co-requisites: MATH-171 or MATH-181 or MATH-181A or MATH-172 or equivalent course.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

MECE-103 **Statics**
This basic course treats the equilibrium of particles and rigid bodies under the action of forces. It integrates the mathematical subjects of calculus, vector algebra and simultaneous algebraic equations with the physical concepts of equilibrium in two and three dimensions. Topics include concepts of force and moment, friction, centroids and moments of inertia, and equilibrium of trusses, frames and machines. (Prerequisites: MECE-102 or PHYS-211 or PHYS-211A or PHYS-206 or equivalent course and restricted to MECE-BS or MECEDU-BS or MECE-MN or ENGRX-UND students.Co-requisites: MATH-182 or MATH-182A or MATH-173 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

MECE-104 **Engineering Design Tools**
This course combines the elements of Design process, Computer Aided Design (CAD), and Machine Shop Fabrication in the context of a design/build/test project. You will learn how to work in a team and use a formalized design process to justify and support design choices, how to use a CAD package to create three-dimensional models and assemblies, and how to safely fabricate metal parts using vertical mills and lathes. (This course is restricted to MECE-BS or MECE-MN or ENGRX-UND or MECEDU-BS Major students.) **Lab 1, Credits 3 (Fall, Spring)**

MECE-104 **Engineering Design Tools**
This course combines the elements of Design process, Computer Aided Design (CAD), and Machine Shop Fabrication in the context of a design/build/test project. You will learn how to work in a team and use a formalized design process to justify and support design choices, how to use a CAD package to create three-dimensional models and assemblies, and how to safely fabricate metal parts using vertical mills and lathes. (This course is restricted to MECE-BS or MECE-MN or ENGRX-UND or MECEDU-BS Major students.) **Lecture 4, Credits 3 (Fall, Spring)**

MECE-110 **Thermodynamics I**
A basic course introducing the classical theory of thermodynamics. Applications of the first law of thermodynamics are used to introduce the student to thermodynamic processes for closed and open systems. The Clausius and Kelvin-Planck statements of the second law are then correlated with the concept of entropy and enthalpy to investigate both real and reversible processes and the thermodynamic properties of pure substances. These techniques are then used to evaluate thermodynamic cycles for a variety of applications in power generation and refrigeration. Students are then introduced to techniques to improve thermal efficiency of these cycles such as reheat, regeneration, and co-generation. (Prerequisites: MECE-102 or PHYS-211 or PHYS-211A or PHYS-206 or equivalent course.Co-requisites: MATH-182 or MATH-182A or MATH-173 or equivalent course.This course is restricted to MECE-BS or MECEDU-BS or MECE-MN or ENGRX-UND students.) **Lecture 3, Credits 3 (Fall, Spring)**

MECE-115 **Model Aircraft Fabrication Laboratory**
This hands-on laboratory course introduces students to Radio Control model airplane construction. Students learn how to construct their own airplanes from balsa and birch ply, how to install control hardware, and how cover these airplanes using heat-shrink covering materials. Students are required to purchase a kit-of-parts to cover material costs, which will allow them to keep their constructed airframe at the end of the course. Radio control hardware will be provided to students for use during the course, and students will have the option to purchase their own RC hardware to turn their airframe into a fully functional RC model airplane. **Lab 2, Credits 1 (Spring)**

MECE-117**Introduction to Programming for Engineers**

This course provides the student with an overview of the use of computer programming for solving problems encountered in engineering. Students will learn how to develop an algorithm for solving a problem and to translate that algorithm into computer code using fundamental structured programming techniques. The programming language(s) employed are selected to support computational problem-solving in higher-level mechanical engineering courses. (This course is restricted to students in MECE-BS or ENGRX-UND or MECEDU-BS. Co-requisite: MATH-181 or MATH-181A or MATH-172 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

MECE-189**Undergraduate Special Topics**

In response to student and/or faculty interest, special courses that are of current interest and/or logical continuation of regular courses will be presented. (Pre-requisites may apply depending on the topic, therefore department permission is required for enrollment) See instructor for more details. **Lecture, Credits 1 - 3 (Fall or Spring)**

MECE-200**Fundamentals of Mechanics**

Statics: equilibrium, the principle of transmissibility of forces, couples, centroids, trusses and friction. Introduction to strength of materials: axial stresses and strains, statically indeterminate problems, torsion and bending. Dynamics: dynamics of particles and rigid bodies with an introduction to kinematics and kinetics of particles and rigid bodies, work, energy, impulse momentum and mechanical vibrations. Emphasis is on problem solving. For students majoring in industrial and systems engineering. (Prerequisites: PHYS-211 or PHYS-211A or 1017-312 or 1017-312T or 1017-389 or PHYS-206 and PHYS-207 or equivalent course and restricted to students in ISEE-BS or ISEEDU-BS programs.) **Lecture 4, Credits 4 (Spring)**

MECE-203**Strength of Materials I**

A basic course in the fundamental principles of the mechanics of deformable media, including stress, strain, deflections and the relationships among them. The basic loadings of tension, compression, shear, torsion and bending are also included. (Prerequisites: MECE-103 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS or MECE-MN students.) **Lecture 3, Credits 3 (Fall, Spring)**

MECE-204**Strength of Materials I Laboratory**

A required laboratory course taken concurrently with MECE-203. Students investigate a metallic material's response to axial, torsional, and bending loads. Students are introduced to reduction and analysis of data, basic experimental techniques, and effective report writing. (This course is restricted to students in MECE-BS or MECEDU-BS or MECE-MN or ENGRX-UND students. Co-requisites: MECE-203) **Lab 2, Credits 1 (Fall, Spring)**

MECE-205**Dynamics**

A basic course in the kinematics and kinetics of particles and rigid bodies. Newton's Laws and the theorems of work-energy and impulse momentum are applied to a variety of particle problems. Systems of particles are employed to transition to the analysis of rigid body problems. Absolute and relative motion are used to investigate the kinematics and kinetics of systems of rigid bodies. Newton's Laws are applied to a variety of two-dimensional rigid body problems. (Prerequisites: MECE-103 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS or MECE-MN students.) **Lecture 3, Credits 3 (Fall, Spring)**

MECE-210**Fluid Mechanics I**

This course investigates the physical characteristics of a fluid: density, stress, pressure, viscosity, temperature, vapor pressure, compressibility. Descriptions of flows include Lagrangian and Eulerian; stream-lines, path-lines and streak-lines. Classification of flows include fluid statics, hydrostatic pressure at a point, pressure field in a static fluid, manometry, forces on submerged surfaces, buoyancy, standard and adiabatic atmospheres. Flow fields and fundamental laws are investigated including systems and control volumes, Reynolds Transport theorem, integral control volume analysis of basic equations for stationary and moving control volumes. Inviscid Bernoulli and the Engineering Bernoulli equation are utilized when analyzing fluid systems. Other concepts studied include incompressible flow in pipes; laminar and turbulent flows, separation phenomenon, dimensional analysis. (Prerequisites: MECE-110 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS or MECE-MN students.) **Lecture 3, Credits 3 (Fall, Spring)**

MECE-211**Engineering Measurements Lab**

This course is focused on developing skills and knowledge in the areas of instrumentation, computer data acquisition (DAQ), measurement theory, uncertainty analysis, data analysis, and technical report writing. Specific topics that are covered include: • Physical dimension variability assessment • Centrifugal pump performance evaluation • Temperature, pressure, and flow instrumentation and measurements • LabVIEW programming and DAQ hardware application • Transient measurements including computer data acquisition • Digital signal input and output Each topic includes background theoretical content with some individual exercises and then a team-based lab with accompanying lab report. Reports are submitted first in draft form and are reviewed by peers in class before preparing them for final draft submission (Prerequisites: MECE-102 or PHYS-211 or PHYS-211A or PHYS-206 or equivalent course and restricted to MECE-BS or MECEDU-BS students.) **Lec/Lab 3, Credits 2 (Fall, Spring)**

MECE-289**Undergraduate Special Topics**

In response to student and/or faculty interest, special courses that are of current interest and/or logical continuation of regular courses will be presented. (Pre-requisites may apply depending on the topic, therefore department permission is required for enrollment) See instructor for more details. **Lecture, Credits 1 - 3 (Fall or Spring)**

MECE-300**Intermediate Machining and Fabrication Lab**

This hands-on laboratory will instruct students in the safe operation of CNC and manual milling, turning, drilling, and other machine shop equipment. Students will develop fundamental machine shop skills needed to function in a machine shop environment. Students will learn to interpret drawings to layout, setup, and machine a series of parts used to build working prototypes. Project may require approximately 2 hours of additional out of class project work in the machine shop each week. This course may be used towards a free elective or engineering topic credit. (Prerequisites: MECE-104 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS students.) **Lab 2, Credits 1 (Fall)**

MECE-301**Engineering Applications Laboratory**

As a modification of the more "traditional" lab approach, students work in teams to complete an open-ended project involving theoretical and empirical analyses of an assigned system, applying engineering concepts and skills learned throughout prior courses. After successfully completing this course, students will have achieved a higher level of understanding of, and proficiency in, the tasks of qualitative treatment of real systems, development and implementation of analytical models, design and implementation of experimental investigations, and validation of results. (Prerequisites: (MECE-102 or PHYS-211 or PHYS-211A or PHYS-206) and MECE-104 and MECE-211 or equivalent courses and is restricted to MECE-BS or MECEDU-BS students. Co-requisites: MECE-210 or equivalent course.) **Lab 2, Credits 2 (Fall, Spring)**

MECE-301**Engineering Applications Laboratory**

As a modification of the more "traditional" lab approach, students work in teams to complete an open-ended project involving theoretical and empirical analyses of an assigned system, applying engineering concepts and skills learned throughout prior courses. After successfully completing this course, students will have achieved a higher level of understanding of, and proficiency in, the tasks of qualitative treatment of real systems, development and implementation of analytical models, design and implementation of experimental investigations, and validation of results. (Prerequisites: (MECE-102 or PHYS-211 or PHYS-211A or PHYS-206) and MECE-104 and MECE-211 or equivalent courses and is restricted to MECE-BS or MECEDU-BS students. Co-requisites: MECE-210 or equivalent course.) **Lecture 1, Credits 2 (Fall, Spring)**

MECE-305**Materials Science with Applications**

This course provides the student with an overview of structure, properties, and processing of metals, polymers, and ceramics. Relevant basic manufacturing processes and materials selection is also discussed. There is a particular emphasis on steels, but significant attention is given to non-ferrous metals, ceramics, and polymers (Prerequisite: MECE-203 or equivalent course. This course is restricted to students in MECE-BS, MECEDU-BS, MECE-MN or ENGRX-UND programs.) **Lecture 3, Credits 3 (Fall, Spring)**

MECE-306**Materials Science and Applications Laboratory**

A required laboratory course taken concurrently with MECE-304 Fundamentals of Materials Science or MECE-305 Materials Science with Applications. Students investigate the effects of the structure, alloying, and processing of materials on their mechanical properties. Students are also introduced to standardized testing methods and effective, professional, report writing. (This course is restricted to students in MECE-BS or MECEDU-BS or MECE-MN or ISEE-BS or ISEEDU-BS or ENGRX-UND students.) **Lab 2, Credits 1 (Fall, Spring)**

MECE-310**Heat Transfer I**

A first course in the fundamentals of heat transfer by conduction, convection and radiation, together with applications to typical engineering systems. Topics include one- and two-dimensional steady state and transient heat conduction, radiation exchange between black and gray surfaces, correlation equations for laminar/turbulent internal and external convection, and an introduction to heat exchangers analysis and design by LMTD and NTU methods. (Prerequisites: MECE-210 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS or MECE-MN students.) **Lecture 3, Credits 3 (Fall, Spring)**

MECE-317**Numerical Methods**

This course entails the study of numerical methods as utilized to model and solve engineering problems on a computing device. Students learn to implement, analyze and interpret numerical solutions to a variety of mathematical problems commonly encountered in engineering applications. Topics include roots of algebraic and transcendental equations, linear systems, curve fitting, numerical differentiation and integration, and ordinary differential equations. Applications are taken from student's background in engineering, science and mathematics courses. (Prerequisites: MATH-231 and MECE-102 or equivalent courses. This course is restricted to MECE-BS or MECEDU-BS or MECE-MN students.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

MECE-320

This required course introduces the student to lumped parameter system modeling, analysis and design. The determination and solution of differential equations that model system behavior is a vital aspect of the course. System response phenomena are characterized in both time and frequency domains and evaluated based on performance criteria. Laboratory exercises enhance student proficiency with model simulation, basic instrumentation, data acquisition, data analysis, and model validation. (Prerequisites: MECE-205 and MATH-231 or equivalent courses. Co-requisites: EEEE-281) This course is restricted to MECE-BS or MECEDU-BS or MECE-MN students.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

System Dynamics

MECE-348

This course introduces students to contemporary technologies in a specific field of mechanical engineering. In the process of exploring these technologies, the course teaches and applies skills related to communication, economic analysis, ethical analysis, and explores the positive and negative effects of technologies on our society and environment. Specific attention is focused on current events both domestically and internationally. (Prerequisite or Co-requisites: MECE-499 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS students.) **Lecture 3, Credits 3 (Fall, Spring)**

Contemporary Issues

MECE-350

This course provides a continuation of concepts pertaining to the mechanics of deformable media and their relation to the failure of materials. Failure topics pertaining to yielding, buckling, fracture, and fatigue for structures under static and dynamic loading conditions are discussed. A function-constraints-objective approach to the mechanical design process is introduced. (Prerequisites: MECE-203 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS students.) **Lecture 3, Credits 3 (Fall, Spring)**

Strengths II

MECE-352

Advanced design and analysis of gas and vapor power cycles, including co-generation and combined cycles, as well as vapor compression and air-conditioning cycles using concepts of exergy based on the 2nd Law of Thermodynamics and the field of thermo-economics. Emphasis is also placed on determining entropy generation and irreversibility within fossil fuel combustion processes using chemical energy. (Prerequisites: MECE-110 and (CHMG-141 or CHMG-131) or equivalent courses. This course is restricted to MECE-BS or MECEDU-BS students.) **Lecture 3, Credits 3 (Fall, Spring)**

Thermodynamics II

MECE-354

Consists of the numerical solution of heat transfer problems. One- and two-dimensional steady-state as well as transient conduction cases are analyzed. A detailed study of single-phase forced and natural convective heat transfer is presented. Heat transfer during pool boiling, flow boiling and condensation is studied. Design aspects of heat transfer equipment are introduced. The students undertake a major design project. (Prerequisites: MECE-310 and MECE-317 or equivalent courses.) **Lecture 3, Credits 3**

Heat Transfer II

MECE-355

A second course in fluid mechanics, integrating concepts of heat and mass transfer. Use of the differential form of the fundamental equations of the conservation of mass, momentum and energy is derived and used throughout. Topics include potential flow, viscous internal plane and pipe flows, external velocity and thermal boundary layers, and the formulations of conductive and convective transport of heat flows. (Prerequisites: MECE-210 or equivalent course. Co-requisites: MECE-310 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

Fluid Mechanics II

MECE-360

In this course the students learn how to numerically solve some boundary value problems using the two most popular techniques: the finite difference (FD) and the finite elements (FE). Simple practical structural and thermal problems are also solved using a commercial FE software (ANSYS or equivalent). (Prerequisites: MECE-317 and MATH-231 or equivalent courses. This course is restricted to MECE-BS or MECEDU-BS or MECE-MN students.) **Lecture 3, Credits 3 (Fall)**

Advanced Computational Techniques

MECE-389

In response to student and/or faculty interest, special courses that are of current interest and/or logical continuation of regular courses will be presented. (Pre-requisites may apply depending on the topic, therefore department permission is required for enrollment) See instructor for more details. **Lecture, Credits 1 - 3 (Fall or Spring)**

Undergraduate Special Topics

MECE-401

This applied course introduces students to the analysis and design of heating, air conditioning and refrigeration systems. Topics include human comfort, ventilation, heating and cooling building loads, energy use modeling, psychrometric properties and processes, mechanical vapor compression and absorption refrigeration cycles, air conditioning systems and equipment. Students will do a team design project. (Prerequisites: MECE-310 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS students.) **Lecture 3, Credits 3 (Spring)**

Heating, Air Conditioning and Refrigeration

MECE-402

Examines the basic principles applicable to all turbomachinery as well as the consideration of the operating and design characteristics of several basic classes of turbomachinery, including, centrifugal pumps, compressors, and turbines, as well as axial compressors and turbines, and hydraulic turbines. Includes a major team design project. (Prerequisites: MECE-210 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS or MECE-MN students.) **Lecture 3, Credits 3 (Fall)**

Turbomachinery

MECE-403

The fundamentals of propulsion including the basic operating principles and design methods for flight vehicle propulsion systems. Topics include air-breathing engines (turbojets, ramjets, turboprops and turbofans) as well as liquid and solid propellant chemical rockets. Students complete a team study project including a written report and a presentation of the results. (Prerequisites: MECE-310 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS or MECE-MN students.) **Lecture 3, Credits 3 (Spring)**

Propulsion

MECE-404

An applied course in the fundamentals and applications of autonomous robots. Emphasis is placed on the use of microcontrollers to construct mobile robots. Topics include microcontroller programming, robot fundamentals, DC servo and stepper motors, encoders, sensors, programming, gripper design, and safety. A major emphasis is placed in a design project involving the design, build, and test of a mobile robot for an application. (Prerequisites: MECE-205 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS students.) **Lec/Lab 4, Credits 3 (Fall)**

Robotics

MECE-405

This course covers wind turbine design, performance and theory. Topics include wind turbine performance and components, modeling and simulation of wind energy systems, assessment of available wind energy resources, and conducting wind energy system impact analysis. This course includes a team design project. (Prerequisites: MECE-110 and MECE-210 or equivalent courses and students in MECE-BS or MECEDU-BS or MECE-MN programs.) **Lecture 3, Credits 3 (Fall or Spring)**

Wind Turbine Engineering

MECE-406

This course covers advanced solid modeling concepts utilizing industry standard parametric 3D modeling software. Part modeling concepts include parametric design, surface modeling and 3D annotation. Assembly modeling concepts include top down assembly, mechanisms and assemblies. GD&T concepts are introduced. (Prerequisites: MECE-104 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS or MECE-MN students.) **Lecture 3, Credits 3 (Fall or Spring)**

Advanced Computer Aided Design

MECE-409

This course presents the essentials of aerodynamic theory. Topics include differential equations of fluid mechanics, airfoil theory, wings of finite span, inviscid potential flows, laminar and turbulent boundary layer, Airfoil design is explored through software. A design project is required. (Prerequisites: MECE-210 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS or MECE-MN students.) **Lecture 3, Credits 3 (Fall)**

Aerodynamics

MECE-412

The principles of deformable bodies as applied to the analysis and design of aircraft structures. Topics include the study of bending and torsion of thin-walled, multi-cell beams and columns; wing and fuselage stress analysis; and structural stability. Strain energy concepts and matrix methods are utilized throughout the course. (Prerequisites: MECE-203 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS or MECE-MN students.) **Lecture 3, Credits 3 (Spring)**

Aerostructures

MECE-421

An introduction to the operation and design of internal combustion engines. Topics include engine types and cycles, fuels, intake and exhaust processes, emissions and emission control systems, heat transfer and lubrication. (Prerequisites: MECE-110 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS or MECE-MN students.) **Lecture 3, Credits 3 (Spring)**

Internal Combustion Engines

MECE-489

In response to student and/or faculty interest, special courses that are of current interest and/or logical continuation of regular courses will be presented. (This course requires permission of the Instructor to enroll.) **Lecture, Credits 1 - 3 (Fall or Spring)**

Undergraduate Special Topics

MECE-497**Multidisciplinary Sr. Design I**

This is the first in a two-course sequence oriented to the solution of real-world engineering design problems. This is a capstone learning experience that integrates engineering theory, principles, and processes within a collaborative environment. Multidisciplinary student teams follow a systems engineering design process, which includes assessing customer needs, developing engineering specifications, generating and evaluating concepts, choosing an approach, developing the details of the design, and implementing the design to the extent feasible, for example by building and testing a prototype or implementing a chosen set of improvements to a process. This first course focuses primarily on defining the problem and developing the design, but may include elements of build/ implementation. The second course may include elements of design, but focuses on build/implementation and communicating information about the final design. (Prerequisites: MECE-301 and MECE-499 or equivalent courses. This course is restricted to MECE-BS or MECEDU-BS students.) **Lecture 6, Credits 3 (Fall, Spring)**

MECE-498**Multidisciplinary Sr. Design II**

This is the second in a two-course sequence oriented to the solution of real-world engineering design problems. This is a capstone learning experience that integrates engineering theory, principles, and processes within a collaborative environment. Multidisciplinary student teams follow a systems engineering design process, which includes assessing customer needs, developing engineering specifications, generating and evaluating concepts, choosing an approach, developing the details of the design, and implementing the design to the extent feasible, for example by building and testing a prototype or implementing a chosen set of improvements to a process. The first course focuses primarily on defining the problem and developing the design, but may include elements of build/ implementation. This second course may include elements of design, but focuses on build/implementation and communicating information about the final design. (Prerequisites: MECE-497 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS students.) **Lecture 6, Credits 3 (Fall, Spring)**

MECE-499**Cooperative Education**

Nominally three months of full-time, paid employment in the mechanical engineering field. (Prerequisites: (MECE-110 and MECE-203 and MECE-211 and EGEN-099) or MECE-499. This course is restricted to MECE-BS or MECEDU-BS students.) **CO OP, Credits 0 (Fall, Spring, Summer)**

MECE-510**Flight Dynamics**

Flight Dynamics is a three (3) credit hour, three (3) contact hour lectures to introduce the student to dynamics of aircraft flight. This course deals with the three-dimensional dynamics of aircraft, including general aircraft performance, stability and control, and handling qualities. Topics include: static and dynamic stability; longitudinal and lateral/directional control; mathematical development of rigid-body 6DOF equations-of-motion describing full range of aircraft motion; attitude dynamics and quaternion alternative; aerodynamic forming term coefficient development; linearization of nonlinear aircraft models; simulation of aircraft trajectories; aircraft system modes; and aircraft handling qualities introduction. (This course is restricted to MECE-BS or MECEDU-BS students.) **Lecture 3, Credits 3 (Spring)**

MECE-511**Orbital Mechanics**

Orbital Mechanics is a three (3) credit hour, three (3) contact hour lectures to introduce the student to mechanics of orbits. This course introduces orbital mechanics and space flight dynamics theory with application for Earth, lunar, and planetary orbiting spacecraft. Content includes: historical background and equations of motion, two-body orbital mechanics, orbit determination, orbit prediction, orbital maneuvers, lunar and interplanetary trajectories, orbital rendezvous and space navigation. The two-body orbital mechanics problem, first approximation to all exploration orbits or trajectories, is covered in full detail. Students develop computer based simulations using Matlab of orbital mechanics problems including a final mission project simulation from Earth to Mars requiring a number of orbit phases and transfers between these phases. (Pre-requisite: This course is restricted to MECE-BS or MECEDU-BS students.) **Lecture 3, Credits 3 (Fall)**

MECE-520**Introduction To Optimal Design**

This course is an introduction to basic optimization techniques for engineering design synthesis. Topics covered include: basic concepts, the general problem statement, necessary conditions of optimization, numerical techniques for unconstrained optimization, constrained optimization through unconstrained optimization, and direct methods. Numerical solutions are obtained using MATLAB software. A design project is required. (Prerequisite: This course is restricted to MECE-BS students. Co-requisite: MECE-320 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MECE-523**Powertrain Systems and Design**

This course will introduce the analysis and design of power transmission systems. Topics covered include spur, helical, bevel, and worm gears, gear trains, planetary gear systems, power transmission shafts, belts and chain drives. The transmission of power at the required speed and torque is the primary function of most power transmission systems, and is the focus of this course. Students will use this foundation to complete a case study project whereby they review and analyse how power is transmitted from the primary source to the remainder of the driveline by means such as manual transmissions, automatic transmissions, continuously variable transmissions, and direct drive systems. (Prerequisites: MECE-350 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS students.) **Lecture 3, Credits 3 (Fall)**

MECE-524**Vehicle Dynamics**

The course focuses on the fundamentals of ground vehicle motion, control, and stability. The structure, stiffness, and mechanisms by which tires generate longitudinal and lateral forces and self-aligning moments are discussed. Steering geometry and steady-state and transient steering response for bicycle and four-wheel vehicle models are analyzed. The effect of suspension geometry and stiffness on stability and ride are discussed. Transmission system design to match engine characteristics and achieve required vehicle performance is discussed. (Prerequisites: MECE-320 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS students.) **Lecture 3, Credits 3 (Spring)**

MECE-529**Renewable Energy Systems**

This course provides an overview of renewable energy system design. Energy resource assessment, system components, and feasibility analysis will be covered. Possible topics to be covered include photovoltaics, wind turbines, solar thermal, hydropower, biomass, and geothermal. Students will be responsible for a final design project. (Prerequisites: MECE-310 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS students.) **Lecture 3, Credits 3 (Fall)**

MECE-538**Design of Machine Systems**

This is an applied course in the selection of components and integration of those components into electro-pneumatic-mechanical devices and systems. Topics involve all aspects of machine design, including drive components and systems, motion generation and control, and electrical control hardware and strategy. (Prerequisites: MECE-205 and MECE-350 or equivalent courses.) **Lecture 4, Credits 3 (Fall, Spring, Summer)**

MECE-543**Classical Controls**

This course introduces students to the study of linear control system behavior for design and use in augmenting system performance. This is accomplished through classical control methods using Laplace transforms, block diagrams, root locus, and frequency domain analysis. Topics include: Laplace transform review, system modeling for control, fundamentals of time response behavior, stability analysis, steady-state error and design, feedback control properties, PID control, root locus analysis and design, and frequency response design. A laboratory will provide students with hands-on analysis and design-build-test experience. (Prerequisites: MECE-320 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS students.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

MECE-544**Introduction To Composite Materials**

This course is an introductory course to the fundamentals and applications of composite materials. Topics covered include constituents of composite materials, fabrication techniques, micromechanical analysis, macromechanical analysis, and the use of composites in design. Some laboratory work is to be performed, and a design project is required. (Prerequisites: MECE-203 and MECE-305 and MATH-241 or equivalent courses and this course is restricted to MECE-BS or MECEDU-BS students. Co-requisite: MECE-317 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

MECE-550**Sustainable Energy Use in Transportation**

The transportation sector represents nominally a third of the total energy consumption in the US, and presently, over 90% of this comes from petroleum sources. Transportation is responsible for about a quarter of greenhouse gas emissions and is a major source for several criteria pollutants. This course will introduce students to engineering practices used to evaluate transportation technologies from the standpoint of sustainability with an emphasis on light duty vehicles. Several emerging technologies including battery and hybrid electric vehicles, fuel cell vehicles, and bio-fuels will be considered. Particular attention will be devoted to the energy efficiency and emissions of the technology at the both vehicle and the fuel source levels. Additionally, the economic and social impacts will be examined. No text book will be assigned, and instead we will rely on open-access publications, journal articles, and electronic text available through the library. Approved as applied elective for the Energy & Environment Option and for the Automotive Option. (Prerequisites: This course is restricted to MECE-BS Major students. Co-requisites: MECE-305 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MECE-555

Biomechatronics

Biomechatronics is an upper level undergraduate and graduate elective course designed to give students an introduction to fundamental concepts in Biomechanics as well as how to relate the biomechanics of motion to robotic systems. Course topics will include Biomechanics of Human Motion, Muscle Mechanics, Biomechanics of Prostheses, Artificial Limbs, Rehabilitation Biomechanics and Robotics, Actuators and Control, Biomimetic Robotics, Robotic Surgery, and Sensors. Students will be provided with fundamental pre-requisite knowledge related to each topic through readings, online resources, and in-class demonstrations. A final project is required. (Prerequisites: MECE-205 or BIME-200 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS or BIME-BS students.) **Lecture 3, Credits 3 (Biannual)**

MECE-556

Applied Biotransport

Review of the fundamentals of momentum, energy and mass transport within the context of biological systems ranging from the organelles in cells to whole plants and animals and their environments. Use of theoretical equations and empirical relations to model and predict the characteristics of diffusive, convective and radiative transport in complex biological systems and their environments. Emphasis is placed on the physical understanding of these systems through the construction of simplified mathematical models amenable to analytical, numerical or statistical formulations and solutions. (Prerequisite: MECE-310 or equivalent course.) **Lecture 3, Credits 3**

MECE-557

Applied Biomaterials

This course provides an overview of materials used in biomedical applications. Topics covered include structure and properties of hard and soft biomaterials, material selection for medical applications, material performance and degradation in hostile environments, and typical and abnormal physiological responses to biomaterials/environments. Some experiments will be performed in class and a major project is required. (Prerequisite: MECE-305 or BIME-370 and MECE-210 or BIME-320 or equivalent course and restricted to MECE-BS or BIME-BS Major students.) **Lecture 3, Credits 3 (Spring)**

MECE-558

Introduction to Engineering Vibrations

Is concerned with analytically finding the dynamic characteristics (natural frequencies and mode shapes) of vibratory mechanical systems (single-degree and multi-degrees of freedom systems), and the response of the systems to external excitations (transient, harmonic, and periodic). Application to vibration damping techniques (Dynamic Vibration Absorbers) is also covered. In addition, laboratory exercises are performed, and an independent design project is assigned. (Prerequisites: MECE-320 or equivalent course. This course is restricted to MECE-BS or MECEDU-BS students.) **Lecture 3, Credits 3 (Fall)**

MECE-570

Manufacturing Processes and Engineering

The overall objective of this course is to provide students the exposure of traditional and non-traditional manufacturing processes which include casting, thermoforming, sheet metal forming, machining, polymer processing, joining, additive manufacturing, and more. Students will learn how to apply the basic properties of materials to manufacturing analysis and product design within an economic framework from lectures and projects. (Prerequisites: MECE-104 and MECE-203 and MECE-305 or equivalent courses and students in MECE-BS programs. Co-requisites: MECE-350 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

MECE-585

Mentored Research

The goal of this course is to introduce students to research methods in an immersive research environment. Students complete independent research under the supervision of faculty and PhD mentors in the mechanical engineering department. Research projects span the range of all engineering disciplines, as well as non-engineering majors such as medical illustration, public policy, business, math and science. Projects are directly related to and supportive of activities important to the faculty member's overall research goals. Students may wish to create a multi-year experience by taking one credit at a time each semester for several years. Student projects then grow and expand as the research and the student's skill set evolves. This course is ideally suited for any student interested in learning about the exciting research taking place at RIT, students considering a master's or PhD, and students in the honors program wanting to earn research credits towards their honors degree. Mechanical engineering dual degree and graduate students may wish to take this course to explore research topics prior to making the decision between project with paper and thesis. Project descriptions are updated regularly and made available on-line and through the mechanical engineering office. Interested students should contact the faculty listed for each project of interest. After meeting with the faculty, projects may be re-scoped to match the student's background, preparation and key interest areas. There may be a limited number of seats available. **Research, Credits 1 - 3 (Fall, Spring)**

MECE-589

UG Upper Level Special Topics

In response to student and/or faculty interest, special courses that are of current interest and/or logical continuation of regular courses will be presented. (Permission of the supervising faculty member and the department head required) See instructor for more details. **Lecture, Credits 1 - 3 (Fall or Spring)**

MECE-599

Undergraduate Independent Study

An independent student project course encompassing one of (a) an analytical investigation, (b) an experimental investigation or (c) a major design project. All independent student projects require a formal written report. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**

Microelectronic Engineering

MCEE-101

Introduction to Nanoelectronics

An overview of semiconductor technology history and future trends is presented. The course introduces the fabrication and operation of silicon-based integrated circuit devices including resistors, diodes, transistors and their current-voltage (I-V) characteristics. The course also introduces the fundamentals of micro/nanolithography, with topics such as IC masking, sensitometry, radiometry, resolution, photoresist materials and processing. Laboratory teaches the basics of IC fabrication, photolithography and I-V measurements. A five-week project provides experience in digital circuit design, schematic capture, simulation, bread-boarding, layout design, IC processing and testing. (This course is restricted to first year students in MCEE-BS or in the Kate Gleason College of Engineering.) **Lab 2, Credits 1 (Fall)**

MCEE-101

Introduction to Nanoelectronics

An overview of semiconductor technology history and future trends is presented. The course introduces the fabrication and operation of silicon-based integrated circuit devices including resistors, diodes, transistors and their current-voltage (I-V) characteristics. The course also introduces the fundamentals of micro/nanolithography, with topics such as IC masking, sensitometry, radiometry, resolution, photoresist materials and processing. Laboratory teaches the basics of IC fabrication, photolithography and I-V measurements. A five-week project provides experience in digital circuit design, schematic capture, simulation, bread-boarding, layout design, IC processing and testing. (This course is restricted to first year students in MCEE-BS or in the Kate Gleason College of Engineering.) **Lecture 1, Credits 1 (Fall)**

MCEE-201

IC Technology

An introduction to the basics of integrated circuit fabrication. The electronic properties of semiconductor materials and basic device structures are discussed, along with fabrication topics including photolithography diffusion and oxidation, ion implantation, and metallization. The laboratory uses a four-level metal gate PMOS process to fabricate an IC chip and provide experience in device design - and layout (CAD), process design, in-process characterization and device testing. Students will understand the basic interaction between process design, device design and device layout. (This course is restricted to EEEE-BS or MCEE-BS students with at least 2nd year standing or with instructor approval.) **Lab 3, Credits 3 (Fall, Spring)**

MCEE-201

IC Technology

An introduction to the basics of integrated circuit fabrication. The electronic properties of semiconductor materials and basic device structures are discussed, along with fabrication topics including photolithography diffusion and oxidation, ion implantation, and metallization. The laboratory uses a four-level metal gate PMOS process to fabricate an IC chip and provide experience in device design - and layout (CAD), process design, in-process characterization and device testing. Students will understand the basic interaction between process design, device design and device layout. (This course is restricted to EEEE-BS or MCEE-BS students with at least 2nd year standing or with instructor approval.) **Lecture 2, Credits 3 (Fall, Spring)**

MCEE-205

Statistics and Design of Experiments

Statistics and Design of Experiments will study descriptive statistics, measurement techniques, SPC, Process Capability Analysis, experimental design, analysis of variance, regression and response surface methodology, and design robustness. The application of the normal distribution and the central limit theorem will be applied to confidence intervals and statistical inference as well as control charts used in SPC. Students will utilize statistical software to implement experimental design concepts, analyze case studies and design efficient experiments. **Lab 3, Credits 3 (Fall)**

MCEE-205

Statistics and Design of Experiments

Statistics and Design of Experiments will study descriptive statistics, measurement techniques, SPC, Process Capability Analysis, experimental design, analysis of variance, regression and response surface methodology, and design robustness. The application of the normal distribution and the central limit theorem will be applied to confidence intervals and statistical inference as well as control charts used in SPC. Students will utilize statistical software to implement experimental design concepts, analyze case studies and design efficient experiments. **Lecture 2, Credits 3 (Fall)**

MCEE-320**E&M Fields for Microelectronics**

An introduction to the fundamentals of electrostatic, magneto-static and time varying fields that culminate with the Maxwell's equations, continuity and Lorentz force that govern the EM phenomena. Importance of Laplace's and Poisson's equations in semiconductor applications is described. Electromagnetic properties of material media are discussed with emphasis on boundary conditions. Plane wave solution of Maxwell's equations is derived and discussed in loss-less and lossy media. Applications in optics include reflection/refraction and polarization of light. A strong knowledge of vector calculus is desired. (Prerequisites: MATH-221 or MATH-221H or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MCEE-360**Semiconductor Devices for Microelectronic Engineers**

An extensive study of semiconductor physics, principles and device operation tied to realistic device structures and fabrication techniques. Topics include semiconductor fundamentals, pn junction diodes, metal-semiconductor junctions, metal-oxide-semiconductor field-effect transistors (MOSFETs), and bipolar junction transistors (BJT). Throughout the course, finite element simulation of realistic device structures (derived from a technology computer aided design tool) using a Poisson solving software package will be used to reinforce key concepts. (Prerequisites: PHYS-212 or PHYS-208 and 209 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MCEE-495**Senior Design I**

A capstone design experience for microelectronic engineering senior students. Students propose a project related to microelectronic process, device, component or system design, to meet desired specifications within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. The students plan a timetable and write a formal proposal. The proposal is evaluated on the basis of intellectual merit, sound technical/research plan, and feasibility. The proposed work is carried through in the sequel course, Senior Design Project II (MCEE-496). Each student is required to make a presentation of the proposal. (Prerequisites: EEEE-480 and 5th year standing in MCEE-BS with completion of two co-ops (MCEE-499).) **Lecture 2, Credits 3 (Fall)**

MCEE-496**Senior Design II**

A capstone design experience for microelectronic engineering senior students. In this course, students conduct a hands-on implementation of the projects proposed in the previous course, Senior Design Project I. Technical presentations of the results, including a talk and a poster, are required at the annual conference on microelectronic engineering organized by the program. A written paper in IEEE format is required and is included in the conference journal. (Prerequisites: MCEE-495 or equivalent course.) **Lec/Lab 2, Credits 3 (Spring)**

MCEE-499**Microelectronic Engineering Co-op**

One semester or summer of paid work experience in microelectronic engineering. (This class is restricted to students in MCEE-BS or BS/MS students in MCEEMSCI-U.) **CO OP, Credits 0 (Fall, Spring, Summer)**

MCEE-502**Semiconductor Process Integration**

This is an advanced level course in Integrated Circuit Devices and process technology. A detailed study of processing modules in modern semiconductor fabrication sequences will be done through simulation. Device engineering challenges such as shallow-junction formation, fin FETs, ultra-thin gate dielectrics, and replacement metal gates are covered. Particular emphasis will be placed on non-equilibrium effects. Silvaco Athena and Atlas will be used extensively for process simulation. (Prerequisites: MCEE-201 or equivalent course. Co-requisite: MCEE-360 or EEEE-260 or equivalent course.) **Lab 2, Credits 3 (Spring)**

MCEE-502**Semiconductor Process Integration**

This is an advanced level course in Integrated Circuit Devices and process technology. A detailed study of processing modules in modern semiconductor fabrication sequences will be done through simulation. Device engineering challenges such as shallow-junction formation, fin FETs, ultra-thin gate dielectrics, and replacement metal gates are covered. Particular emphasis will be placed on non-equilibrium effects. Silvaco Athena and Atlas will be used extensively for process simulation. (Prerequisites: MCEE-201 or equivalent course. Co-requisite: MCEE-360 or EEEE-260 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MCEE-503**Thin Films**

This course focuses on the deposition and etching of thin films of conductive and insulating materials for IC fabrication. A thorough overview of vacuum technology is presented to familiarize the student with the challenges of creating and operating in a controlled environment. Physical and Chemical Vapor Deposition (PVD & CVD) are discussed as methods of film deposition. Plasma etching and Chemical Mechanical Planarization (CMP) are studied as methods for selective removal of materials. Applications of these fundamental thin film processes to IC manufacturing are presented. (Prerequisites: MCEE-201 or equivalent course.) **Lab 3, Credits 3 (Fall)**

MCEE-503**Thin Films**

This course focuses on the deposition and etching of thin films of conductive and insulating materials for IC fabrication. A thorough overview of vacuum technology is presented to familiarize the student with the challenges of creating and operating in a controlled environment. Physical and Chemical Vapor Deposition (PVD & CVD) are discussed as methods of film deposition. Plasma etching and Chemical Mechanical Planarization (CMP) are studied as methods for selective removal of materials. Applications of these fundamental thin film processes to IC manufacturing are presented. (Prerequisites: MCEE-201 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

MCEE-505**Lithography Materials and Processes**

Microlithography Materials and Processes covers the chemical aspects of microlithography and resist processes. Fundamentals of polymer technology will be addressed and the chemistry of various resist platforms including novolac, styrene, and acrylate systems will be covered. Double patterning materials will also be studied. Topics include the principles of photoresist materials, including polymer synthesis, photochemistry, processing technologies and methods of process optimization. Also advanced lithographic techniques and materials, including multi-layer techniques for BARC, double patterning, TARC, and next generation materials and processes are applied to optical lithography. (Prerequisites: CHMG-131 and CHMG-141 or equivalent courses.) **Lab 3, Credits 3 (Fall)**

MCEE-505**Lithography Materials and Processes**

Microlithography Materials and Processes covers the chemical aspects of microlithography and resist processes. Fundamentals of polymer technology will be addressed and the chemistry of various resist platforms including novolac, styrene, and acrylate systems will be covered. Double patterning materials will also be studied. Topics include the principles of photoresist materials, including polymer synthesis, photochemistry, processing technologies and methods of process optimization. Also advanced lithographic techniques and materials, including multi-layer techniques for BARC, double patterning, TARC, and next generation materials and processes are applied to optical lithography. (Prerequisites: CHMG-131 and CHMG-141 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

MCEE-515**Nanolithography Systems**

An advanced course covering the physical aspects of micro- and nano-lithography. Image formation in projection and proximity systems are studied. Makes use of optical concepts as applied to lithographic systems. Fresnel diffraction, Fraunhofer diffraction, and Fourier optics are utilized to understand diffraction-limited imaging processes and optimization. Topics include illumination, lens parameters, image assessment, resolution, phase-shift masking, and resist interactions as well as non-optical systems such as EUV, maskless, e-beam, and nanoimprint. Lithographic systems are designed and optimized through use of modeling and simulation packages. **Lab 3, Credits 3 (Spring)**

MCEE-515**Nanolithography Systems**

An advanced course covering the physical aspects of micro- and nano-lithography. Image formation in projection and proximity systems are studied. Makes use of optical concepts as applied to lithographic systems. Fresnel diffraction, Fraunhofer diffraction, and Fourier optics are utilized to understand diffraction-limited imaging processes and optimization. Topics include illumination, lens parameters, image assessment, resolution, phase-shift masking, and resist interactions as well as non-optical systems such as EUV, maskless, e-beam, and nanoimprint. Lithographic systems are designed and optimized through use of modeling and simulation packages. **Lecture 3, Credits 3 (Spring)**

MCEE-520**Photovoltaic Science and Engineering**

This course focuses on the principle and engineering fundamentals of photovoltaic (PV) energy conversion. The course covers modern silicon PV devices, including the basic physics, ideal and non-ideal models, device parameters and design, and device fabrication. The course discusses crystalline, multi-crystalline, amorphous thin films solar cells and their manufacturing. Students will become familiar with basic semiconductor processes and how they are employed in solar cells manufacturing. The course further introduces third generation advanced photovoltaic concepts including compound semiconductors, spectral conversion, and organic and polymeric devices. PV applications, environmental, sustainability and economic issues will also be discussed. Evaluations include assignments and exams, a research/term paper on a current PV topic. (This class is restricted to degree seeking students with at least 4th year level.) **Lecture 3, Credits 3 (Spring)**

MCEE-550**CMOS Processing**

A laboratory course in which students manufacture and test CMOS integrated circuits. Topics include design of individual process operations and their integration into a complete manufacturing sequence. Students are introduced to work in process tracking, ion implantation, oxidation, diffusion, plasma etch, LPCVD, and photolithography. Student learn VLSI design fundamentals of circuit simulation and layout. Analog and Digital CMOS devices are made and tested. This course is organized around multidisciplinary teams that address the management, engineering and operation of the student run CMOS factory. (Prerequisites: (EEEE-260 or MCEE-360) and MCEE-502 and MCEE-505 or equivalent courses.) **Lab 4, Credits 4 (Fall)**

MCEE-599

Independent Study

A supervised investigation within a microelectronic engineering area of student interest. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 5 (Fall, Spring, Summer)**

College of Engineering Technology

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Course numbering: RIT courses are generally referred to by their alphanumeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100-299), upper division (300-599), or graduate level (600 and above).

Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.

Civil Engineering Technology

CVET-099 Fundamentals of Engineering (FE) Exam Review
This non-credit bearing optional course prepares students for the Fundamentals of Engineering (FE) exam. Material in the civil engineering discipline is emphasized. Much of the class time is devoted to problem solving, and students have ample practice in working through practical problems in civil engineering as they prepare for the FE examination. **Class fee is required** (This class is restricted to students with at least 4th year standing in CVET-BS, ESHS-BS, CPET-BS, EEET-BS, TCET-BS, EMET-BS, MCET-BS, MFET-BS, RMET-BS or PACK-BS.) **Seminar 3, Credits 0 (Fall, Spring)**

CVET-140 Materials of Construction
A study of common construction materials in civil engineering with particular emphasis on Portland cement concrete and asphalt cement concrete. Aggregates, Portland cement, and asphalt cement (each an ingredient in the concretes) are studied extensively. Mass-volume relationships are explored in relation to these materials. An overview of laboratory testing procedures for evaluating these materials is provided. Important properties of masonry, steel, and wood products are also discussed. (Co-requisites: CVET-141 or equivalent course.) **Lecture 2, Credits 2 (Fall)**

CVET-141 Materials of Construction Laboratory
The Materials of Construction Laboratory will be taken concurrently with Materials of Construction (CVET-140). Standard laboratory tests will be performed for evaluating the properties of aggregate, Portland cement concrete, asphalt cement concrete, and mortar. Mix design procedures for Portland cement concrete and asphalt cement concrete will be learned and used. An introduction to green building materials will be provided. (Co-requisites: CVET-140 or equivalent course.) **Lab 2, Credits 1 (Fall)**

CVET-150 Computer Aided Design and Drafting
Introduction to engineering graphics as a means of communication in the technical fields. The course is laboratory oriented and provides the student with basic skills to create and edit professional 2D and 3D drawings with this comprehensive first course in the use of computer aided design and drafting (CADD) software for (mechanical, architectural and civil drawings). The course assumes no prior knowledge of engineering drawing or CADD. **Lec/Lab 4, Credits 2 (Spring)**

CVET-160 Surveying
Introduction to fundamentals of surveying. Topics include note taking; differential leveling; vertical and horizontal measurement; traversing; topographic mapping; horizontal, vertical, compound and reverse curves; and earthwork. (Co-requisites: CVET-161 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

CVET-161 Surveying Laboratory
Students apply the fundamentals of surveying to field exercises using modern surveying equipment. Field exercises include differential leveling, cross sections, traversing, topographic mapping, horizontal curve layout, vertical curve design, and earthwork estimation. (Co-requisites: CVET-160 or equivalent course.) **Lab 2, Credits 1 (Fall)**

CVET-170 Elements of Building Construction
Elements and details of building construction, both residential and commercial, are explored. The course does not focus on design, but rather on specific building components, and on how these components work together to create a functional building. Some of the topics include foundations, wood light frame, heavy timber frame, steel, concrete, masonry, glass, roofing, cladding systems, and interior finishes. The role of building codes in design and construction is introduced. Sustainable building materials and systems are also introduced. (This course is restricted to CVET-BS or CONMGT-MN students.) **Lecture 3, Credits 3 (Spring)**

CVET-180 Introduction to Civil Engineering
The objective of this course is to develop in the student an understanding of plans and drawings in civil engineering projects such as site development, structures, hydraulic structures, water and wastewater transport and treatment facilities, and transportation facilities. Students will also understand how related disciplines—architecture, mechanical and electrical engineering, and landscape architecture—are incorporated into construction drawings. Students develop an understanding of the technical and legal purpose of plans and how to assemble them. (Co-requisites: CVET-181 or equivalent course.) **Lecture 2, Credits 2 (Fall)**

CVET-181 Introduction to Civil Engineering Lab
The purpose of this course is to provide students with hands on learning of fundamental and innovative tools in the area of civil engineering graphics. Students will apply information from the co-requisite course to understand how construction drawing sets and drawing components are organized and generated. Spreadsheet methods will be used to solve design problems and building information modeling software will be introduced in the DDL computer lab. (Co-requisites: CVET-180 or equivalent course.) **Lab 2, Credits 1 (Fall)**

CVET-210 Statics
An introduction to the analysis of static structures covering free-body diagrams, forces, moments, vectors, equilibrium, friction, and analysis of structures and truss members. Applications are drawn from civil engineering technology. (Prerequisites: PHYS-111 or 1017-211 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

CVET-210 Statics
An introduction to the analysis of static structures covering free-body diagrams, forces, moments, vectors, equilibrium, friction, and analysis of structures and truss members. Applications are drawn from civil engineering technology. (Prerequisites: PHYS-111 or 1017-211 or equivalent course.) **Recitation 2, Credits 3 (Spring)**

CVET-220 Strength of Materials
Study how forces and moments affect axial, shearing, and bending stresses and deflections of structural members. The relationships between stress and strain, for both axial and torsional loading, are explored. Beams, shafts, and columns are analyzed and designed based on stress and deformation. Combined stress states are analyzed, including using Mohr's circle. Statically indeterminate problems are evaluated. Euler's equations and column design principles are studied and applied. (Prerequisites: CVET-210 or equivalent course.) **Lecture 4, Credits 4 (Fall)**

CVET-220 Strength of Materials
Study how forces and moments affect axial, shearing, and bending stresses and deflections of structural members. The relationships between stress and strain, for both axial and torsional loading, are explored. Beams, shafts, and columns are analyzed and designed based on stress and deformation. Combined stress states are analyzed, including using Mohr's circle. Statically indeterminate problems are evaluated. Euler's equations and column design principles are studied and applied. (Prerequisites: CVET-210 or equivalent course.) **Recitation 2, Credits 4 (Fall)**

CVET-230 Elementary Structures
Applications of the principles of statics and strength of materials to the analysis and design of basic structural elements in buildings such as beams, T-beams, columns, slabs, and footings. Topics include analysis of gravity loads in buildings, along with analysis and design of both structural steel and reinforced concrete members found in buildings. The Allowable Stress Design approach (AISC) is used for steel, while the ACI code is used for concrete. Design and analysis of steel connections are covered also. (Prerequisites: CVET-220 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

CVET-240 Elementary Soil Mechanics
An introduction to soil mechanics and its application to problems encountered in civil engineering design and construction. Major topics include soil properties and classification, weight-volume relationships, compaction/ground improvement, groundwater flow, stresses in soils, settlement analysis, and shear strength. (Prerequisites: CVET-220 or equivalent course. Co-requisites: CVET-241 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

CVET-241 **Elementary Soil Mechanics Lab**
The Elementary Soil Mechanics Laboratory will be taken concurrently with CVET-240. Standard laboratory tests will be performed for evaluating the properties of soils including gradation, plasticity, compaction, permeability, compressibility, and shear strength. (Co-requisites: CVET-240 or equivalent course.) **Lab 2, Credits 1 (Spring)**

CVET-250 **Hydraulics**
A study of the principle physical properties of liquids, hydrostatic pressure and forces, buoyancy and flotation, Bernoulli's Law, Conservation of Energy and Mass, and the concept of momentum. These fundamentals are applied in the analysis and design of closed conduit systems, open channel flow, pumps and pump selection and storage facilities. Rainfall runoff relationships and applications to stormwater management are also introduced. (Prerequisites: CVET-210 or equivalent course. Co-requisites: CVET-251 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

CVET-251 **Hydraulics Lab**
Experimental study of principle physical properties of liquids and major laws of fluid mechanics. Students will conduct several experiments that illustrate the theory and design principles taught in lecture. (Co-requisites: CVET-250 or equivalent course.) **Lab 2, Credits 1 (Fall)**

CVET-300 **Land Development Computer Applications**
The purpose of this course is to provide the student with an introduction to civil 3D software and how to use the application and its tools to create standardized civil engineering and drafting projects. The course enables students to complete transportation, site, sewer, storm drain, and subdivision projects quickly, while using the tools to dynamically link and generate automatic design updates. (Prerequisites: CVET-150 and ((CVET-160 and CVET-161) or 0608-340) and ((CVET-180 and CVET-181) or 0608-220) or equivalent courses.) **Lec/Lab 3, Credits 2 (Fall)**

CVET-332 **Structural Analysis and Modeling**
Introduction of classical and modern computational techniques to analyze statically determinate and indeterminate structures. Topics include beams, 2D trusses, 2D frames, cables and arches, moving loads and influence lines, approximate methods and moment distribution. Computer-aided structural analysis using commercial structural analysis software STAAD is involved. (Prerequisites: CVET-220 or equivalent course.) **Lecture 4, Credits 4 (Fall)**

CVET-350 **Highway Design**
This course exposes students to the fields of highway and traffic engineering. The areas of planning, design, construction, and operation are covered. Emphasis is placed on specific skills needed in these fields, including highway standards; geometry and alignment; traffic signal timing and design, drainage; earthwork; safety standards; and structures. (Prerequisites: CVET-300 or equivalent course. Co-requisites: CVET-351 or equivalent course.) **Lecture 2, Credits 2 (Spring)**

CVET-351 **Highway Design Lab**
This lab offering provides students with an introduction to MicroStation, which is a computer aided drafting and design course used primarily by federal and state departments of transportation (DOT). Open Roads, is a 3D software that uses MicroStation as an operating platform. Open roads is also commonly used by DOT agencies. MicroStation/Open Roads is analogous to AutoCAD/Civil3D. Students, after completing this course, will be able to successfully utilize the civil geometry tools to create geometry for roadway projects. (Prerequisites: CVET-300 or equivalent course. Co-requisites: CVET-350 or equivalent course.) **Lab 3, Credits 2 (Spring)**

CVET-412 **Pavement Design**
This elective course provides detailed coverage of the engineering aspects of asphalt and Portland cement concrete pavement design, bringing together relevant concepts from construction materials, soil mechanics, and transportation engineering. The course includes design of new pavements and also addresses the topics of the assessment, rehabilitation, and recycling of existing pavements. In addition to focusing on highway/roadway pavements, an overview of airport pavements is presented. Problems are attacked in a practical manner, utilizing design guides and expertise from national organizations and state highway departments. (Prerequisites: ((CVET-140 and CVET-141) or 0608-330) and ((CVET-240 and CVET-241) or 0608-360) or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

CVET-414 **Traffic Analysis**
The fundamentals of traffic engineering, traffic operation and control are covered. The design of intersection control is covered. Topics included are, driver/vehicle characteristics, traffic control devices, traffic stream characteristics, statistical applications in traffic engineering, traffic volume studies and characteristics, vehicle routing, speed changes, speed reduction zones, fixed time signal control and related topics. (Prerequisites: CVET-350 and CVET-351 or equivalent course.) **Lec/Lab 4, Credits 3 (Spring)**

CVET-421 **Land Use Planning**
The environmental and social aspects as well as the engineering and cost considerations of land-use planning are covered. Topics included are zoning concepts, master plans, subdivision regulations and design criteria, flood plains, environmentally sensitive areas, wetlands, other planning and control tools, solar access planning, and urban revitalization. Students are involved in an independent project consisting of a concept design for a subdivision or other land-use project. Extensive use is made of field trips and attendance at appropriate meetings or work sessions. (Prerequisites: CVET-300 or equivalent course.) **Lec/Lab 4, Credits 3 (Spring)**

CVET-422 **Solid Waste Management and Recycling**
An introduction to the civil engineering aspects of dealing with resource recovery and waste management, with a focus on source reduction. Topics covered are the history of the problems, the resulting societal reaction and legislation, and present day handling, minimizing, recycling, or disposing of materials historically treated as wastes. Emphasis is placed on those aspects in which the civil engineer plays a prominent role such as material recovery facilities, municipal solid waste landfills and hazardous waste permanent storage facilities, land application of municipal wastewater biosolids, composting, and other resource recovery and environmental protection engineering projects. The processes employed for reuse and recycling will be reviewed with examples from major sectors. Use is made of lectures, reading materials, outside speakers, field trips, and certain projects. (This class is restricted to students with at least 3rd year standing in the CVET-BS program.) **Lecture 3, Credits 3 (Fall)**

CVET-423 **GIS for CETEMS**
This course examines the fundamentals of geographic information systems and their application in the fields of civil engineering and environmental management. It emphasizes the application of GIS technology to problems such as, but not limited to, water resource management, asset management, environmental impact assessments, urban planning, and transportation. (Enrollment in this course is restricted to students with at least 3rd year standing in CVET-BS or ESHS-BS.) **Lec/Lab 4, Credits 3 (Spring)**

CVET-424 **Building Information Modeling with Revit**
The primary objective of the Revit course is to teach students the concepts of Building Information Modeling (BIM) technology and introduce the tools for parametric building design and documentation using Revit Architecture. Students will be able to create full 3D architectural project models and generate working drawings. The course focuses on design development tools - building the 3D model with foundation, walls, windows, doors, floors, roofs, stairs, creating reflected ceiling plans and furniture plans. Students will add views and annotation to the sheets to create a set of construction documents. (Prerequisites: CVET-150 or equivalent course.) **Lec/Lab 3, Credits 3 (Spring)**

CVET-431 **Structural Steel Design**
This course covers the design of structural members and frames and their connections in steel structures. Topics include principles of structural design and the code of ethics in engineering practices, structural loads and systems, steel grade and shapes, steel framing and deck design, tension members, compression members, non-composite beams, beam-columns, column base plates, bolted connections, and welded connections. The use of AISC Steel Construction Manual is emphasized and a comprehensive group design project is assigned. Some computer work for structural modeling is involved. (Prerequisites: CVET-332 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

CVET-432 **Reinforced Concrete Design**
This course covers the design of structural members and frames of reinforced concrete. Topics include principles of structural design and loads; properties of concrete and reinforcement and the code of ethics in engineering practices; analysis and design of floor slabs, beams and girders including doubly reinforced and T-beams, columns, and footings, cantilever retaining walls, bearing walls, unreinforced concrete basement walls, shear walls, corbels and brackets. The use of the ACI code, is emphasized and a comprehensive group design project is assigned. Some computer work is involved. (Prerequisites: CVET-332 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

CVET-433 **Structural Timber Design**
Design wood structures. Topics include properties of structural lumber, design of wood structural members including beams, columns, beam-columns, trusses, studs, plywood diaphragms and shear walls, and design of structural member connections. Emphasis is on the use of NDC Wood Design Package. A comprehensive group design project is assigned. Some computer work is involved. (Prerequisites: CVET-332 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

CVET-434 **Design of Highway Bridges**
Design concrete and steel bridges. Topics include types of bridges, design loads on bridges, live load distribution, design of prestressed concrete girders, design of I-plate steel girders, design of reinforced concrete deck, design of bridge foundations, and introduction to multi-span bridges. Emphasis is on the use of the AASHTO LRFD Bridge Design Specifications and bridge design software, and a comprehensive group design project is assigned. Some computer work is involved. (Prerequisites: CVET-332 and CVET-431 or CVET-432 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

CVET-435**Prestressed Concrete**

This course focuses on the fundamental concepts of prestressed concrete design. Topics include prestressing systems, types of prestressing, materials used in prestressed concrete, analysis and design of pre- and post-tensioned systems, design of connections, losses in prestress. Emphasis is given on the use of the current industry standards and a design project. (Prerequisites: CVET-332 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

CVET-436**Masonry Structures**

This course focuses on the fundamental concepts of structural design with masonry elements. Topics include historical perspective of masonry technology, materials used in masonry construction, general design requirements for masonry, structural design of unreinforced and reinforced masonry elements, masonry construction practices, repairs and improvements to masonry walls. Emphasis is given on the use of the building codes for masonry structures and a comprehensive group design project. (Prerequisites: CVET-332 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

CVET-437**Principles of Dynamics in Civil Engineering Technology**

Study of the basic principles of engineering dynamics. Topics include kinematics of particles, force, mass and acceleration, work and energy, force-impulse and momentum, and an introduction to vibrations and structural dynamics. Applications to practical civil engineering problems are emphasized. (Prerequisites: MATH-211 or equivalent course and at least 3rd year standing.) **Lecture 2, Credits 2 (Fall)**

CVET-440**Foundation Engineering**

This course will study the geotechnical engineering aspects of foundation design. Focus is on bearing capacity analysis and spread footing design, mat foundations, pile capacity and pile foundation design, drilled shafts, lateral earth pressures and retaining wall design, and an introduction to slope stability analysis. (Prerequisites: (CVET-240 and CVET-241) or 0608-360 or equivalent courses.) **Lecture 3, Credits 3**

CVET-441**Soil Retention and Stabilization Methods**

In this course students will develop skills for the selection, design, and construction of specialized soil retention and soil stabilization systems used in geotechnical engineering. The systems and techniques covered will include specialty retaining walls including anchored bulkheads, MSE walls, and segmental walls; temporary excavation support systems including soldier pile and lagging and steel sheet piling with tieback anchors or internal bracing; soil improvement and reinforcement including wick drains with preload, stone columns/aggregate piers, and geosynthetics/geogrids; and other current ground improvement techniques including grouting. (Prerequisites: CVET-440 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

CVET-450**Principles of Water and Wastewater Treatment**

An introduction to water and wastewater treatment, interpretation of analyzed physical, chemical, and biological aqueous characteristics associated with the design and operation of treatment processes. Fundamental principles and applications of physical, chemical, and biological processes employed in the treatment of drinking water and sanitary wastewater will be covered. Fundamental components and design procedures for gravity sewer systems will be introduced. (Prerequisites: CVET-250 and CVET-251 and (CHMG-122 or CHMG-142) or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

CVET-451**Design of Water and Wastewater Treatment Facilities**

Hydraulic, biological, and chemical principles of water and wastewater treatment processes are applied to the design of municipal treatment works. Process, plant design, and construction elements are stressed. (Prerequisites: CVET-450 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

CVET-452**Groundwater Hydraulics**

Groundwater movement analysis and engineering design applications. Topics include construction dewatering, groundwater remediation, flow-net analysis, flow analysis to wells and trenches, design of groundwater collection systems, pump selection, and groundwater's interaction with engineered structures. Application of groundwater computer software. (Prerequisites: CVET-250 and CVET-251 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

CVET-453**Stormwater Management**

This course focuses on the fundamental design concepts of surface water hydrology and how these concepts are applied to the management of stormwater for municipal and development projects. Topics include rainfall/runoff relationships, groundwater hydrology, hydrographs, soil erosion and sediment control, storm sewer design, and green infrastructure. Practical engineering procedures, using desktop and state-of-the-practice hydraulic and hydrologic software, are introduced to analyze existing conditions and design new solutions. (Prerequisites: CVET-250 and CVET-251 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

CVET-462**Construction Project Management**

An introduction to construction management. Project administrative roles and relationships among the various project team participants are explored. Topics include specifics of construction project start-up including procurement, project buyout, and job site layout and control. Subcontracts and relationship with subcontractors are explored. Construction related documentation including contract documents, submittals, information requests, change orders, progress payments, bonds, insurances, and project closeout is discussed. Safety, quality, and project closeout are also covered. **Lecture 3, Credits 3 (Spring)**

CVET-464**Construction Planning, Scheduling and Control**

This course covers planning, organization, scheduling, and control of construction projects. The components of construction project planning are examined. Students are exposed to and gain practice in using the Critical Path Method (CPM) in scheduling, Monte Carlo risk analysis and monitoring the progress of construction projects. Cost control and resource allocation/resource management are explored. (This course is restricted to CVET-BS or CONMGT-MN students.) **Lec/Lab 4, Credits 3 (Fall)**

CVET-465**Contracts and Specifications**

This course includes a fundamental overview of contract law, followed by the application of this material in the contracts for construction. Subsequently, the student is exposed to construction specifications. Substantial use is made of actual documents such as those of the New York State Department of Transportation, The Construction Specification Institute, Engineers Joint Contract Committee (EJCDC), American Institute of Architects (AIA), Associated General Contractors (AGC) and trade standards such as ANSI, ASTM, and others. Students are required to develop and assemble a mock-up set of contract documents and develop agreements/contracts. Arbitration, design-build, and partnering are discussed. (This course is restricted to CVET-BS or CONMGT-MN students.) **Lecture 3, Credits 3 (Spring)**

CVET-489**Special Topics in CVET**

Subject offerings of new and developing areas of knowledge in civil engineering technology intended to augment the existing curriculum. Special Topics courses are offered periodically. Watch for titles in the course listing each semester. **Lecture 3, Credits 1 - 3 (Spring)**

CVET-499**Civil Engineering Technology Co-op**

One semester or summer block of appropriate work experience in a related industry. Department permission is required. (This course is restricted to CVET-BS Major students.) **CO OP, Credits 0 (Fall, Spring, Summer)**

CVET-500**Civil Engineering Technology Capstone**

A capstone course in civil engineering technology. This course builds on and integrates the engineering concepts developed in prior course work into the complete design of a major civil engineering project. The course will require a written and an oral presentation of the completed design to include, where appropriate, plans and specifications. (Prerequisites: At least 5th year standing with a minimum of 2 terms of CVET-499 completed.) **Lecture 3, Credits 3 (Spring)**

CVET-505**Sustainable Building Design and Construction**

Course material will focus on the design, engineering, and construction of sustainable buildings and how the construction manager guides the project team to meet the owner's objectives of a sustainable facility. Students will explore the primary differences and similarities between the different green building rating systems, including the Leadership in Energy and Environmental Design (LEED) rating system developed by the U.S. Green Building Council. This course may be cross-listed with CONM-690; BSMS program students are advised to enroll in the graduate level course. **Lecture 3, Credits 3 (Spring)**

CVET-561**Construction Cost Analysis and Management**

An introduction to direct cost estimating for construction projects. The estimating techniques covered include quantity take-off, labor productivity, and pricing (labor, material, and equipment). Drawings, sketches, and specifications are used as a basis for developing quantities involving site work, concrete, masonry, steel, carpentry, and finishes. Students also use software tools to aid in developing takeoff quantities. Different estimate structures and various types of estimates are examined. Direct and indirect construction costs are explored along with approaches for estimating overhead costs and profit. A logistical study of Project Cost Management and Cost Control & Forecasting methods, including Earned Value Method. This course may be cross-listed with CONM-661; BSMS program students are advised to enroll in the graduate level course. **Lecture 3, Credits 3 (Spring)**

CVET-589**Special Topics:**

Special Topics is an experimental upper-division course intended as a means for offering innovative topics not currently reflected in the existing civil engineering technology curriculum. This is offered periodically, watch for titles in the course listing each semester. Special Topics course offerings may be co-listed with a graduate Special Topics course. (Enrollment in this course is restricted to students with at least 3rd year standing in CVET-BS or ESHS-BS.) **Lecture, Credits 1 - 3 (Fa/sp/su)**

CVET-599

Independent Study

A supervised investigation within a civil engineering technology area of student interest. Consent of the faculty sponsor and departmental approval are required. Students are limited to a maximum of three semester credit hours of independent study projects and two sections in any semester, plus a maximum of six semester credit hours of independent study credits earned toward degree requirements. **Ind Study, Credits 1 - 3 (Spring, Summer)**

Computer Engineering Technology

CPET-121

Computational Problem Solving I

This is the first course in a two-course sequence in computational problem solving of engineering and scientific problems. The problems solved will stress the application of sequence, selection, repetitive, invocation operations, and arrays. The development of proper testing procedures to ensure computational accuracy will be stressed. Students, upon successful completion of this course, will be able to analyze introductory engineering and scientific problems, design, code, test, and document procedural software solutions. **Lec/Lab 4, Credits 3 (Fall, Spring)**

CPET-133

Introduction to Digital and Microcontroller Systems

This course introduces students to the underlying building blocks of digital system and microcontroller design. Digital systems topics that are covered include: number systems, truth tables, Boolean algebra, combinational and sequential logic, and finite state machines. A microcontroller is used to teach register programming, reading and writing digital I/O, bitwise operations and bit-masking and microprocessor architecture. Laboratory exercises are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics. **Lab 2, Credits 3 (Fall)**

CPET-133

Introduction to Digital and Microcontroller Systems

This course introduces students to the underlying building blocks of digital system and microcontroller design. Digital systems topics that are covered include: number systems, truth tables, Boolean algebra, combinational and sequential logic, and finite state machines. A microcontroller is used to teach register programming, reading and writing digital I/O, bitwise operations and bit-masking and microprocessor architecture. Laboratory exercises are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics. **Lecture 2, Credits 3 (Fall)**

CPET-141

Digital Fundamentals

An introduction to digital electronics, emphasizing the concepts that are fundamental to any digital system: number systems, truth tables, Boolean algebra, Karnaugh maps, combinational and sequential logic, digital arithmetic, TTL/CMOS logic families and SSI, MSI, and PLD device implementation. Students, upon completion of this course, will have the necessary skills to analyze and design introductory combinational and sequential logic circuits. (Co-requisites: CPET-142 or equivalent course.) **Lecture 2, Credits 2 (Fall or Spring)**

CPET-142

Digital Fundamentals Lab

Laboratory work to complement the lecture material covered in Digital Fundamentals (CPET-141). The laboratories are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics. Students, upon completion of this course, will have the necessary skills to analyze, design, and implement introductory combinational and sequential logic circuits. (Co-requisites: CPET-141 or equivalent course.) **Lab 2, Credits 1 (Fall, Spring)**

CPET-231

Digital Systems Design

This course covers the design and simulation of digital circuits using modern digital design techniques. Using a hardware description language, students will design, synthesize, and analyze finite state machines and combinational, sequential, and arithmetic logic circuits. Topics will include design for synthesis, verification techniques, memory circuits, programmable logic devices, and implementation technologies. (Prerequisites: ((CPET-141 and CPET 142) or 0618-301) or equivalent courses. Co-Requisites: CPET-232 or equivalent course.) **Lecture 2, Credits 2 (Fall)**

CPET-232

Digital Syst Design Lab

Laboratory work to complement the lecture material covered in Digital Systems Design (CPET-231). The laboratories are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics. (Co-requisites: CPET-231 or equivalent course.) **Lab 2, Credits 1 (Fall)**

CPET-233

Digital Systems Design

This course covers the design and simulation of digital circuits using modern digital design techniques. Using a hardware description language, students will design, synthesize, and analyze finite state machines and combinational, sequential, and arithmetic logic circuits. Topics will include design for synthesis, verification techniques, memory circuits, programmable logic devices, and implementation technologies. The laboratories are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics. (Prerequisites: CPET-133 or (CPET-141 and CPET-142) or equivalent courses.) **Lab 2, Credits 3 (Fall)**

CPET-233

Digital Systems Design

This course covers the design and simulation of digital circuits using modern digital design techniques. Using a hardware description language, students will design, synthesize, and analyze finite state machines and combinational, sequential, and arithmetic logic circuits. Topics will include design for synthesis, verification techniques, memory circuits, programmable logic devices, and implementation technologies. The laboratories are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics. (Prerequisites: CPET-133 or (CPET-141 and CPET-142) or equivalent courses.) **Lecture 2, Credits 3 (Fall)**

CPET-251

Microcontroller Systems

This course presents typical structures and applications of microcontroller systems. Emphasis will be on hardware, programming, input/output methods, typical peripherals/interfaces (including Timers, ADC and micro-to-micro communications), interrupt handling and small system design and applications using high level programming languages. Microprocessor architecture and assembly programming will be introduced to provide a base for more advanced digital designs. (Prerequisites: CPET-121 and CPET-141 and CPET-142 or equivalent courses. Co-requisites: CPET-252 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

CPET-252

Microcontroller Systems Lab

This course implements the techniques and concepts developed in microcontroller systems. Emphasis is placed on the use of an Integrated Development Environment (IDE) to program a microcontroller at the register level. Skills in debugging, implementation, and demonstration of basic microcontroller systems will be developed. (Prerequisites: CPET-121 and CPET-141 and CPET-142 or equivalent courses. Co-requisites: CPET-251 or equivalent course.) **Lab 2, Credits 1 (Spring)**

CPET-253

Microcontroller Systems

This course presents typical structures and applications of microcontroller systems. Emphasis will be on: hardware, programming, input/output methods, typical peripherals/interfaces (including Timers, ADC and micro to micro communications), interrupt handling and small system design and applications using high level programming languages. Microprocessor architecture and assembly programming will be introduced to provide a base for more advanced digital designs. Laboratory exercises are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics. (Prerequisites: CPET-121 and (CPET-133 or (CPET-141 and CPET-142)) or equivalent courses.) **Lab 2, Credits 3 (Spring)**

CPET-253

Microcontroller Systems

This course presents typical structures and applications of microcontroller systems. Emphasis will be on: hardware, programming, input/output methods, typical peripherals/interfaces (including Timers, ADC and micro to micro communications), interrupt handling and small system design and applications using high level programming languages. Microprocessor architecture and assembly programming will be introduced to provide a base for more advanced digital designs. Laboratory exercises are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics. (Prerequisites: CPET-121 and (CPET-133 or (CPET-141 and CPET-142)) or equivalent courses.) **Lecture 2, Credits 3 (Spring)**

CPET-281

Networking Technologies

This course provides a practical study of voice and data communications from the point of the OSI seven-layer and the TCP/IP five-layer protocol model. Both traditional circuit switched telecommunications as well as IP based communications are studied. This course covers the operation of the lower four layers in detail by examining some of the foundation laws of physics including Nyquist and Shannon as well as selected protocols. Emphasis is placed on data inter-networking, local-area networking, and wide-area networking. This course is a problem based course in that students apply the learning to various computer and networking mathematical problems and are assessed on their ability to solve the problem. (Prerequisites: MATH-111 or MATH-171 or MATH-181 or MATH-181A or equivalent course.) **Lecture 3, Credits 3 (Spring)**

CPET-321**Computational Problem Solving II**

This is the second course in a two-course sequence in computational problem solving of engineering and scientific problems. The problems solved will stress the application of data structures and object oriented classes. Data encapsulation, data management, and design robustness will be stressed. Students, upon successful completion of this course, will be able to analyze complex engineering and scientific problems, design, code, test, and document object-oriented software solutions. (Prerequisites: CPET-121 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall)**

CPET-341**Hardware Description Language**

This course is a more in depth coverage of current logic design and verification methodologies using a modern hardware description language (HDL). Topics include coding for different levels of abstraction, implementation of arithmetic circuits and finite state machines, hierarchical designs, reusable component design, data and control path, best coding practices, design constraints and verification. Students, upon completion of this course, will have the necessary skills to analyze and design advanced hardware descriptions of combinational and sequential logic circuits using design and verification best practices and methodologies. (Prerequisites: (CPET-231 and CPET-232) or 0618-438 or equivalent courses. Co-Requisites: CPET-342 or equivalent course.) **Lecture 2, Credits 2 (Fall)**

CPET-342**Hardware Descrip Language Lab**

Laboratory work to complement the lecture material covered in Hardware Description Language. The laboratories are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics. Students, upon completion of this course, will have the necessary skills to analyze, design, and implement advanced hardware descriptions of combinational and sequential logic circuits using design and verification best practices and methodologies. (Co-requisites: CPET-341 or equivalent course.) **Lab 2, Credits 1 (Fall)**

CPET-343**Hardware Description Language**

This course is a more in depth coverage of current logic design and verification methodologies using a modern hardware description language (HDL). Topics include coding for different levels of abstraction; implementation of arithmetic circuits and finite state machines, hierarchical designs, reusable component design, data and control path, best coding practices, design constraints and verification. The laboratories are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics. (Prerequisites: C- or better CPET-233 or (CPET 231 & CPET 232) or equivalent course.) **Lab 2, Credits 3 (Fall)**

CPET-343**Hardware Description Language**

This course is a more in depth coverage of current logic design and verification methodologies using a modern hardware description language (HDL). Topics include coding for different levels of abstraction; implementation of arithmetic circuits and finite state machines, hierarchical designs, reusable component design, data and control path, best coding practices, design constraints and verification. The laboratories are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics. (Prerequisites: C- or better CPET-233 or (CPET 231 & CPET 232) or equivalent course.) **Lecture 2, Credits 3 (Fall)**

CPET-371**Special Topics**

Special Topics is an experimental lower-division course intended as a means for offering innovative topics not currently reflected in either the Computer or Electrical Engineering Technology curriculums **Lecture, Credits 1 - 3 (Fall, Spring, Summer)**

CPET-421**Applied Audio Programming**

The modern audio industry seeks individuals who can implement creative tools for audio and music engineers. This course teaches students how to develop audio software and/or applications for music, sound, and audio engineering and assists them in acquiring programming skills for the audio industry. The course consists of four sections: (1) fundamentals of audio signal processing, (2) audio effects used in digital audio equipment (e.g. digital mixers), (3) applied audio signal processing technologies, and (4) Virtual Studio Technology (VST) plugin programming. The sub-topics include (but are not limited to) gain, delay, filter structures (IIR, FIR), EQ, Reverberator, Compressor, Beamforming, Adaptive filtering, VST plugin development. Students will be evaluated through both knowledge on audio signal processing and practical implementation of a VST plugin as a final project. **Lecture 3, Credits 3 (Fall)**

CPET-461**Real Time Operating Systems**

This course will provide students with an introduction to operating systems theory, and practical problem solving approaches to real-time systems. An embedded real-time operating system is used as the foundation for a variety of programming projects. Students, upon successful completion of this course, will be able to understand the operation and describe the various components of an operating system. They will be able to evaluate design trade-offs and selection criteria for different types of operating systems, and demonstrate the ability to write multiple process that run together within an embedded, real-time operating system. (Prerequisites: ((CPET-251 and CPET-252) or CPET-253) and CPET-321 or equivalent courses.) **Lecture 2, Credits 3 (Spring)**

CPET-461**Real Time Operating Systems**

This course will provide students with an introduction to operating systems theory, and practical problem solving approaches to real-time systems. An embedded real-time operating system is used as the foundation for a variety of programming projects. Students, upon successful completion of this course, will be able to understand the operation and describe the various components of an operating system. They will be able to evaluate design trade-offs and selection criteria for different types of operating systems, and demonstrate the ability to write multiple process that run together within an embedded, real-time operating system. (Prerequisites: ((CPET-251 and CPET-252) or CPET-253) and CPET-321 or equivalent courses.) **Lab 2, Credits 3 (Spring)**

CPET-499**Cooperative Education – Computer Engineering Technology**

One semester or summer block of appropriate work experience in a related industry. Students are required to complete a poster and presentation and participate in the ECJET co-op presentation evening at the completion of each co-op experience. Department permission is required. (Prerequisites: EEET-299 and (CPET-253 or (CPET-251 and CPET-252)) and CPET-321 or equivalent courses.) **CO OP, Credits 0 (Fall, Spring, Summer)**

CPET-561**Embedded Systems Design I**

This is an embedded systems architecture and design course. Microprocessor, as well as system level design principles will be analyzed from both a hardware and software perspective. Assembly language and C are used to develop software applications for a 32-bit embedded processor. Application software emphasizes interrupt driven operation and peripheral interfacing. A hardware description language is used to design and debug embedded components for an FPGA-based system. During the course's laboratory component, students will be design and debug hardware and software systems, evaluate design trade-offs and choose the best design solution, and perform functional and timing analysis of an embedded system. Student must register for BOTH the Lecture and Laboratory components of this course. (Prerequisites: (CPET-253 or (CPET-251 and CPET-252)) and (CPET-343 or (CPET-341 and CPET-342)) with grades of C- or better or equivalent courses.) **Lab 2, Credits 4 (Fall)**

CPET-561**Embedded Systems Design I**

This is an embedded systems architecture and design course. Microprocessor, as well as system level design principles will be analyzed from both a hardware and software perspective. Assembly language and C are used to develop software applications for a 32-bit embedded processor. Application software emphasizes interrupt driven operation and peripheral interfacing. A hardware description language is used to design and debug embedded components for an FPGA-based system. During the course's laboratory component, students will be design and debug hardware and software systems, evaluate design trade-offs and choose the best design solution, and perform functional and timing analysis of an embedded system. Student must register for BOTH the Lecture and Laboratory components of this course. (Prerequisites: (CPET-253 or (CPET-251 and CPET-252)) and (CPET-343 or (CPET-341 and CPET-342)) with grades of C- or better or equivalent courses.) **Lecture 3, Credits 4 (Fall)**

CPET-563**Embedded Systems Design II**

This project-based course is the culmination of the curriculum capstone experience for the computer engineering technology major. This course will be focused around a project that includes product ideation, project/resource management techniques, and best practices; system level specification, modeling, partition, and design; team collaboration and communication; best documentation practices; industry level coding practices; hardware and software co-design methodologies; design reuse and intellectual property creation; design verification and validation; and design sign-off. (Prerequisites: CPET-561 or equivalent course.) **Lab 2, Credits 3 (Spring)**

CPET-563**Embedded Systems Design II**

This project-based course is the culmination of the curriculum capstone experience for the computer engineering technology major. This course will be focused around a project that includes product ideation, project/resource management techniques, and best practices; system level specification, modeling, partition, and design; team collaboration and communication; best documentation practices; industry level coding practices; hardware and software co-design methodologies; design reuse and intellectual property creation; design verification and validation; and design sign-off. (Prerequisites: CPET-561 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

Applied Technical Leadership

CETL-350

Leadership Development

This course focuses on personal, individual development of a leadership style to enhance students in applied technical leadership careers. To achieve this outcome, the course content includes a foundation in leadership principles; how leadership styles evolve and are created based on individual preferences and personality traits, the impact situations and challenges can have on personal leadership styles. This is a required core course in the Applied Technical Leadership degree. Course is available to undergraduate students only on a space available basis and if ATL admission requirements of associate degree and 3 years fulltime work experience is satisfied with DSS department permission. (This class is restricted to students with at least 3rd year standing in ATLEAD-BS.) **Lecture 3, Credits 3 (Fall)**

CETL-355

Contemporary Problems in Applied Technical Leadership

This course will focus on contemporary issues in leadership in healthcare, enforcement and public service in the applied technical leadership arena. Using case studies and scholarly and press media, current issues in leadership will be discussed allowing students to go in depth into contemporary leadership styles and paradigms. Discussion will center on how leadership styles are developed, the consequences of these leadership styles on events, and the evolution of the development of leadership styles. This is a required core course in the Applied Technical Leadership degree. Course is available to undergraduate students only on a space available basis and if ATL admission requirements of associate degree and 3 years fulltime work experience is satisfied with DSS department permission. (This class is restricted to students with at least 3rd year standing in ATLEAD-BS.) **Lecture 3, Credits 3 (Spring)**

CETL-400

Crisis Intervention in Applied Technical Leadership

This course provides an opportunity for students in the helping professions to reflect on personal styles of dealing with conflict and stress which impact on how they as individuals deal with crisis situations. Building on this self-knowledge student will learn a variety of tools and ideas to use to deal with crisis which occur in these helping professions. This is a required core course in the Applied Technical Leadership degree. Course is available to undergraduate students only on a space available basis and if ATL admission requirements of associate degree and 3 years fulltime work experience is satisfied with DSS department permission. (This class is restricted to students with at least 3rd year standing in ATLEAD-BS.) **Lecture 3, Credits 3 (Spring)**

CETL-490

Senior Project

As a capstone course students will demonstrate an integration of skills and knowledge gained from their program of study for the ATL degree through the selection of a research topic/question within the scope of the ATL program. Students will conduct research including: literature review, gathering primary data; assessing and summarizing this data; and report on results including inferred conclusions based on data analysis and the literature. This is a required core course in the Applied Technical Leadership degree. **Project 3, Credits 3 (Fall, Spring)**

Electrical Engineering Technology

EEET-111

DC Circuits

Develops the skills to analyze and design practical DC circuits used in electronic devices. Topics include resistance with circuit techniques of Ohm's Law; current and voltage division; simplification of series, parallel, series-parallel circuits; bridge and ladder networks; Kirchhoff's source conversions, branch analysis; Thevenin and Norton theorems; superposition theorems and nodal analysis. Inductance and capacitance are introduced and transient circuits are studied. (Co-requisites: EEET-112 and (MATH-111 or MATH-171 or MATH-181 or MATH-181A) or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

EEET-112

DC Circuits Lab

Develops skills and practice in the design, fabrication, measurement and analysis of practical DC circuits used in electronic devices. Topics include the measurement relative to: resistance, current, and voltage with circuit techniques of Ohm's Law; current and voltage division; simplification of series, parallel, series-parallel circuits; bridge and ladder networks; Kirchhoff's Laws; power; and transient circuit behavior. Laboratory verification of DC analytical and techniques is included. Printed circuit board (PCB) design, fabrication, and assembly is also included emphasizing the development of soldering skill proficiency. (Co-requisites: EEET-111 or equivalent course.) **Lab 2, Credits 1 (Fall, Spring)**

EEET-115

Circuits I

This course develops student skills to analyze and design DC and AC circuits. DC topics include resistance; Ohm's Law; current and voltage division; simplification of series, parallel, and series-parallel circuits; ladder network analysis; Kirchhoff's Voltage and Kirchhoff's Current Laws, source conversions and branch analysis. Additional circuit analysis concepts covered include Thevenin and superposition theorems. AC circuit analysis topics include sinusoidal waveforms as forcing functions; basic R-L-C elements and phasors, including average power and power factor and series AC circuit analysis. Complex numbers and mathematical operations are introduced and utilized to solve series AC circuit problems. Reactance and impedance are introduced and used to solve series circuits. (Co-requisite: EEET-116 and MATH-111 or MATH-171 or MATH-181 or MATH-181A or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

EEET-115

Circuits I

This course develops student skills to analyze and design DC and AC circuits. DC topics include resistance; Ohm's Law; current and voltage division; simplification of series, parallel, and series-parallel circuits; ladder network analysis; Kirchhoff's Voltage and Kirchhoff's Current Laws, source conversions and branch analysis. Additional circuit analysis concepts covered include Thevenin and superposition theorems. AC circuit analysis topics include sinusoidal waveforms as forcing functions; basic R-L-C elements and phasors, including average power and power factor and series AC circuit analysis. Complex numbers and mathematical operations are introduced and utilized to solve series AC circuit problems. Reactance and impedance are introduced and used to solve series circuits. (Co-requisite: EEET-116 and MATH-111 or MATH-171 or MATH-181 or MATH-181A or equivalent course.) **Recitation 1, Credits 3 (Fall, Spring)**

EEET-116

Circuits I Lab

This laboratory develops skills and practice in the construction, measurement and analysis of DC and introductory AC circuits. Standard laboratory equipment is introduced and utilized to measure resistance, voltage and current in basic and relatively complex circuit configurations. Measurements are employed extensively to verify Ohm's Law; Kirchhoff's Voltage and Kirchhoff's Current Laws and to demonstrate current and voltage division. Circuit simulation software is used throughout to support calculations and establish a baseline for comparison. Students collaborate within teams to research technology areas of curiosity, observe trends about the changing world and inform their peers via verbal presentations. (Co-requisite: EEET-115 or equivalent course.) **Lab 2, Credits 1 (Fall, Spring)**

EEET-121

AC Circuits

Develops the skills to analyze and design practical AC circuits used in electrical systems. Topics include network theorems, reactance and impedance, AC power and power factor, resonance, maximum power transfer, frequency response, and bandwidth. (Prerequisites: C- or better in (EEET-111 & EEET-112) or 0609-215 or equivalent courses. Co-requisites: EEET-122 and MATH-171 or MATH-181 or MATH-181A.) **Lecture 3, Credits 3 (Fall, Spring)**

EEET-122

AC Circuits Lab

Develops skills and practice in the design, fabrication, measurement, and analysis of practical AC circuits used in electrical systems. Topics include network theorems, reactance and impedance, AC power and power factor, resonance, maximum power transfer, frequency response, and bandwidth. (Co-requisites: EEET-121 or equivalent courses.) **Lab 2, Credits 1 (Fall, Spring)**

EEET-125

Circuits II

This course develops the skills to analyze and design AC circuits used in electrical systems. Topics include R-L and R-C transient analysis; reactance and impedance; series, parallel, and series-parallel R-L-C circuits; mesh and nodal analysis. Additional circuit analysis concepts covered include Norton, Maximum Power Transfer, and Superposition theorems. AC power and power factor, resonance, frequency response, and bandwidth are also covered. Transformers and polyphase systems are introduced. (Prerequisites: C- or better in EEET-115 and EEET-116 or equivalent course. Co-requisite: EEET-126 and MATH-171 or MATH-181 or MATH-181A or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

EEET-125

Circuits II

This course develops the skills to analyze and design AC circuits used in electrical systems. Topics include R-L and R-C transient analysis; reactance and impedance; series, parallel, and series-parallel R-L-C circuits; mesh and nodal analysis. Additional circuit analysis concepts covered include Norton, Maximum Power Transfer, and Superposition theorems. AC power and power factor, resonance, frequency response, and bandwidth are also covered. Transformers and polyphase systems are introduced. (Prerequisites: C- or better in EEET-115 and EEET-116 or equivalent course. Co-requisite: EEET-126 and MATH-171 or MATH-181 or MATH-181A or equivalent course.) **Recitation 1, Credits 3 (Fall, Spring)**

EEET-126**Circuits II Lab**

This laboratory develops skills and practice in the construction, measurement, and analysis of AC circuits. The function generator and oscilloscope are used to measure resistance, voltage and current in a variety of circuit configurations. Measurements are employed extensively to verify Ohm's Law; Kirchhoff's Voltage and Kirchhoff's Current Laws and to demonstrate current and voltage division. Circuit simulation software is used throughout to support calculations and establish a baseline for comparison. Students collaborate within teams to research technology areas of curiosity, observe trends about the changing world and inform their peers via verbal presentations. (Co-requisite: EEET-125 or equivalent course.) **Lab 2, Credits 1 (Fall, Spring)**

EEET-211**Electronics I**

Develops the knowledge and ability to design active electronic circuits using diodes, bipolar and field effect transistors. Emphasis is placed on device characteristics and specifications, biasing circuits and transistor modeling. Applications of class A, B, and D amplifiers including frequency response and thermal analysis are studied. (Prerequisites: EEET-121 and EEET-122 and (MATH-171 or MATH-181) or equivalent courses. Co-requisites: EEET-212 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

EEET-212**Electronics I Lab**

Provides experience in the design, prototyping, measurement, and analysis of diodes and transistors circuits. Emphasis is placed on understanding device characteristics and specifications while building and troubleshooting biasing circuits and transistor modeling. Applications of class A, B, and D amplifiers including frequency response and thermal analysis. (Prerequisites: EEET-121 and EEET-122 and MATH-171 or MATH-181 or equivalent courses. Co-requisites: EEET-211 or equivalent course.) **Lab 2, Credits 1 (Fall, Spring)**

EEET-213**Electronic Devices**

This course covers the analysis, design and implementation of active electronic circuits using diodes, bipolar and field effect transistors and operational amplifiers. The electrical and switching characteristics of semiconductor devices used for analog and digital circuits will be emphasized. Classic applications of analog signal conditioning, A/D & D/A conversion and power transformation (AC/DC & DC/DC) will be examined. Laboratory exercises are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics. (Prerequisites: (EEET-125 and EEET-126) or (EEET-121 and EEET-122) or (EEET-215 and EEET-216) and (MATH-171 or MATH-181 or MATH-181A) or equivalent courses.) **Lab 2, Credits 3 (Fall)**

EEET-213**Electronic Devices**

This course covers the analysis, design and implementation of active electronic circuits using diodes, bipolar and field effect transistors and operational amplifiers. The electrical and switching characteristics of semiconductor devices used for analog and digital circuits will be emphasized. Classic applications of analog signal conditioning, A/D & D/A conversion and power transformation (AC/DC & DC/DC) will be examined. Laboratory exercises are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics. (Prerequisites: (EEET-125 and EEET-126) or (EEET-121 and EEET-122) or (EEET-215 and EEET-216) and (MATH-171 or MATH-181 or MATH-181A) or equivalent courses.) **Lecture 2, Credits 3 (Fall)**

EEET-215**Circuits and Electronics**

Develops the skills to analyze introductory AC and DC circuits and electronics. Topics include Ohm's Law; current and voltage division; simplification of circuits; reactance and impedance; and operational amplifier applications including current sources, strain gauge amplifiers, differential amplifiers and comparator circuits. (Prerequisites: (MATH-111 or MATH-171 or MATH-181) or (NMTH-260 or NMTH-272 or NMTH-275 and NMTH-220) or equivalent courses. Co-requisites: EEET-216 or equivalent course.) **Lecture 2, Credits 2 (Fall, Spring)**

EEET-216**Circuits and Electronics Laboratory**

Students, upon completion of this course, will be able to use laboratory tools to analyze and troubleshoot AC and DC and basic electronic circuits. They will be able to operate a power supply, multi-meter, function generator, and oscilloscope. (Co-requisites: EEET-215 or equivalent course.) **Lab 2, Credits 1 (Fall, Spring)**

EEET-221**Electronics II**

Develops the knowledge and ability to design active electronic circuits, such as audio amplifiers, using op-amps. The operational amplifier and its applications are covered in detail. Applications include math operations like integration and differentiation, comparator circuits, and signal conditioning. The effects of op-amp limitations, both DC and AC, are studied. (Prerequisites: (EEET-211 and EEET-212) or 0609-361 or equivalent courses with grades of C- or better. Co-Requisites: EEET-222 or equivalent course.) **Lecture 2, Credits 2 (Fall, Spring)**

EEET-222**Electronics II Lab**

Provides experience in the design, prototyping, measurement, and analysis of op-amp circuits. Circuits include microphone pre-amps, integration and differentiation, comparator circuits, and signal conditioning. (Prerequisites: C- or better in EEET-212 and EEET-212 or equivalent courses. Co-requisites: EEET-221 or equivalent course.) **Lab 2, Credits 1 (Fall, Spring)**

EEET-223**Advanced Electronics**

This course develops the knowledge and skills essential for the analysis, design, and implementation of electronic sensor circuits and their interface to a microcontroller. Analog signal conditioning circuits, active filters, data converters and voltage regulators will be emphasized. Laboratory exercises are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics. (Prerequisites: (C- or better in EEET-213) and (CPET-133 or (CPET-141 and CPET-142)) or equivalent courses.) **Lab 2, Credits 4 (Spring)**

EEET-223**Advanced Electronics**

This course develops the knowledge and skills essential for the analysis, design, and implementation of electronic sensor circuits and their interface to a microcontroller. Analog signal conditioning circuits, active filters, data converters and voltage regulators will be emphasized. Laboratory exercises are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics. (Prerequisites: (C- or better in EEET-213) and (CPET-133 or (CPET-141 and CPET-142)) or equivalent courses.) **Lecture 2, Credits 4 (Spring)**

EEET-225**Electronic Amplifiers**

Develop the skills to analyze and design electronic circuits. Topics include: semiconductor theory, diodes, transistors and multiple operational amplifier applications including: current sources, strain gauge amplifiers, differential amplifiers and comparator circuits. (Prerequisites: EEET-121 and EEET-122 or 0609-411 or equivalent course. Co-Requisites: EEET-226 or equivalent course.) **Lecture 2, Credits 2 (Spring)**

EEET-226**Electronic Amplifiers Laboratory**

Students, upon completion of this course, will be able to use laboratory tools to analyze and troubleshoot electronic circuits. They will be able to operate a power supply, multi-meter, function generator, and oscilloscope. (EEET-225 Coreq) **Lab 2, Credits 1 (Spring)**

EEET-241**Electrical Machines and Transformers**

Develops the knowledge and ability to analyze and specify motors, generators, and transformers for use in systems such as wind turbines and electric vehicles. Topics include efficiency, energy conservation, power factor, magnetism, electro-magnetic force, fields, armatures, commutators, rotors, stators, brushes, starters, controllers, DC machines, AC motors, alternators, single phase and three phase dynamos, three phase circuits, phasors, transformer properties, isolation, efficiency, and voltage regulation. (Prerequisites: (EEET-125 and EEET-126) or (EEET-121 and EEET-122) or (EEET-215 and EEET-216) and (MATH-171 or MATH-181 or MATH-181A) or equivalent courses. Co-requisite: EEET-242 or equivalent course.) **Lecture 2, Credits 2 (Fall, Spring)**

EEET-242**Electrical Machines and Transformers Lab**

Provides experience with motors, generators, and transformers. Topics include power factor, magnetism, electro-magnetic force, fields, armatures, commutators, rotors, stators, brushes, starters, controllers, DC machines, AC motors, alternators, single phase and three phase dynamos, three phase circuits, phasors, transformer properties, isolation, efficiency, and voltage regulation. (Co-requisites: EEET-241 or equivalent course.) **Lab 2, Credits 1 (Fall, Spring)**

EEET-247**Microprocessors and Digital Systems**

Applications of a contemporary digital designs and microcontrollers will be used to teach students digital logic, microcontroller programming, and microcontroller interfacing. This course is intended as a service course for non-electrical majors who have not taken the digital fundamentals course. (Prerequisites: (MATH-111 or MATH-171 or MATH-181 or MATH-181A) or (NMTH-260 or NMTH-272 or NMTH-220) and CPET-121 or equivalent courses. Co-requisites: EEET-248 or equivalent course.) **Lecture 2, Credits 2 (Fall)**

EEET-248**Microprocessors and Digital Systems Laboratory**

This laboratory covers applications of microcontroller fundamentals. Topics include digital logic, microcontroller programming and interfacing. The activities for this course utilize typical microcontroller and application hardware. (Prerequisites: MATH-111 or MATH-171 or MATH-181 or MATH-181A and CPET-121 or equivalent course. Co-requisites: EEET-247 or equivalent course.) **Lab 2, Credits 1 (Fall)**

EEET-251**Green Energy Systems**

An alternative energy course that will cover all types of available sources such as hydroelectric power, wind energy, combustion turbines, active and passive solar, photovoltaic systems, fuel cells, combined heat and power systems, biomass, geothermal, ocean, and nuclear energy. Power electronic components (inverters and converters) and components necessary for connection to the electrical power grid will be discussed. Alternative energy storage systems will be analyzed. Also, economics, global warming, government regulations, and tax initiatives for green energy products will be discussed. (Prerequisites: (PHYS-111 or 1017-211) or (PHYS-211 or PHYS-211A or 1017-312 or 1017-312T or 1017-389) or equivalent course. Co-requisites: EEET-252 or equivalent course.) **Lecture 2, Credits 2 (Biannual)**

- EEET-252** **Green Energy Systems Laboratory**
Laboratory work to complement the lecture material covered in Green Energy Power Systems (EEET-251). Experiments in photovoltaic cells, wind turbines, and fuel cells will be investigated. Electrolysis will be used to generate hydrogen required in the fuel cell experiment. Connection to the grid is demonstrated using a three-phase synchronous generator and disconnect switch-gear. (Co-requisites: EEET-251 or equivalent course.) **Lab 2, Credits 1 (Biannual)**
- EEET-261** **Fundamentals of Audio Engineering**
This course provides a fundamental study of the technology and practice used in recording, editing, mixing, production, and distribution of sound. Topics include microphone types, selection and application the mixing console, mixing techniques and introduction to Signal Processing equipment and associated techniques, an introduction to the concepts relating to digital audio technology such as sampling, the Nyquist theorem, alias frequencies, quantization, dynamic range, compression and their applications will be covered. Topics include basics of digital audio, session creation, importing media, recording techniques, editing, mixing, and mastering. In addition, the course teaches how-to-listen sonic difference to appropriately apply the technical knowledge and to achieve highest sound quality. (Prerequisites: MATH-101 or MATH-111 or MATH-171 or MATH-181 or MATH-181A equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**
- EEET-299** **EET Career Orientation**
This course is an introduction to the professional engineering careers, cooperative educational program at RIT, the programs in the department, and RIT resources. Topics include engineering technology vs. engineering, review of resources available at RIT, the cooperative education placement process, working in a diverse workforce, and engineering ethics including the IEEE Code of Ethics. The ethical expectations of employers for co-op students and RIT during a job search. (This class is restricted to students with at least 3rd year student standing in EEET-BS or CPET-BS.) **Lecture 1, Credits 1 (Fall)**
- EEET-311** **Communications Electronics**
Develops the knowledge and ability to design communication electronics, such as AM/FM radios using transistors and integrated circuits. This course applies the concepts of circuits and electronics to basic analog communication circuits for amplitude and frequency modulation. Topics studied are RF Amplifiers, Fourier Analysis, AM and FM transmission and reception, phase-locked loops, synthesizers, oscillators, DSB and SSB communication systems, antennas, and EM wave propagation. (Prerequisites: (EEET-221 and EEET-222) or 0609-362 or equivalent courses with grades of C- or better . Co-Requisites: EEET-312 or equivalent course.) **Lecture 2, Credits 2 (Fall)**
- EEET-312** **Communications Electronics Lab**
Provides experience in the practice and application of the concepts of circuits and electronics to basic analog communication circuits for amplitude and frequency modulation in a laboratory environment. Construction and measurement are emphasized. Topics studied are RF amplifiers, Fourier analysis, construction of an AM and/or FM receiver, oscillators, filters, and circuit simulation. (Co-requisites EEET-311 or equivalent course.) **Lab 2, Credits 1 (Fall)**
- EEET-313** **Communications Electronics**
Develops the knowledge and ability to design communication electronics, such as AM/FM radios using transistors and integrated circuits. This course applies the concepts of circuits and electronics to basic analog communication circuits for amplitude and frequency modulation. Topics studied are RF Amplifiers, Fourier Analysis, AM and FM transmission and reception, phase-locked loops, synthesizers, oscillators, DSB and SSB communication systems, antennas and EM wave propagation. The course's laboratory component Provides experience in the practice and application of the concepts of circuits and electronics to basic analog communication circuits for amplitude and frequency modulation in a laboratory environment. Construction and measurement are emphasized. Student must register for BOTH the Lecture and Laboratory components of this course. (Prerequisite: C- or better in (EEET-221 and EEET-222) or EEET-223 or equivalent course.) **Lab 2, Credits 3 (Fall)**
- EEET-313** **Communications Electronics**
Develops the knowledge and ability to design communication electronics, such as AM/FM radios using transistors and integrated circuits. This course applies the concepts of circuits and electronics to basic analog communication circuits for amplitude and frequency modulation. Topics studied are RF Amplifiers, Fourier Analysis, AM and FM transmission and reception, phase-locked loops, synthesizers, oscillators, DSB and SSB communication systems, antennas and EM wave propagation. The course's laboratory component Provides experience in the practice and application of the concepts of circuits and electronics to basic analog communication circuits for amplitude and frequency modulation in a laboratory environment. Construction and measurement are emphasized. Student must register for BOTH the Lecture and Laboratory components of this course. (Prerequisite: C- or better in (EEET-221 and EEET-222) or EEET-223 or equivalent course.) **Lecture 2, Credits 3 (Fall)**
- EEET-331** **Signals, Systems and Transforms**
Develops the analytical skills to design, develop, and simulate analog and digital filters, control systems, and advanced electronic circuits such as those used in robotics, digital communications, and wireless systems. Continuous-time and discrete-time linear, time-invariant, casual systems are examined throughout the course. Topics include Fourier series, the Laplace transform, signal sampling, and the z-transform. Advanced circuit analysis techniques include circuit characterization in the s-plane. (Prerequisites: (EEET-125 and EEET-126) or (EEET-121 and EEET-122) or (EEET-215 and EEET-216) and (MATH-211 or MATH-231) or equivalent courses. Co-requisites: EEET-332 or equivalent course.) **Lecture 3, Credits 3 (Fall)**
- EEET-332** **Signals, Systems and Transforms Lab**
MATLAB is introduced and used extensively to analyze circuits on continuous-time and discrete-time systems. PSPICE is utilized for circuit simulation. (Prerequisites: (EEET-125 and EEET-126) or (EEET-121 and EEET-122) or (EEET-215 and EEET-216) and (MATH-171 or MATH-181 or MATH-181A) or equivalent courses. Co-requisites: EEET-331 or equivalent course.) **Lab 1, Credits 1 (Fall)**
- EEET-351** **Solar Photovoltaic Applications**
This course addresses the practical application of solar cells to producing electricity for commercial, residential, utility-scale, and electric vehicle charger installations. The course begins with an introduction to the characteristics of the sun as an energy source. Next, the construction of solar cells and their performance characteristics are discussed. System design for battery backup and grid connected systems is then explored. Options for integration of PV systems within the building architecture are discussed and the influence of codes and standards on system design and system cost are examined. (Prerequisites: (PHYS-111 or 1017-211) or (PHYS-211 or PHYS-211A or 1017-312 or 1017-312T or 1017-389) or equivalent course. Co-requisites: EEET-352 or equivalent course.) **Lecture 2, Credits 2 (Biannual)**
- EEET-352** **Solar Photovoltaic Applications Lab**
An integrated set of laboratory exercises provides hands-on operational experience with photovoltaic cells and systems and reinforces key concepts from the accompanying solar photovoltaic applications course. (Co-requisites: EEET-351 or equivalent course.) **Lab 2, Credits 1 (Biannual)**
- EEET-353** **Fuel Cell Systems**
An introduction to fuel cell technology and fuel cell systems covering theory, operation, and application. Begins with the fundamental principles of fuel cells, developing the key equations governing performance, and establishes a framework for evaluating environmental and economic benefits of fuel cell systems. High and low temperature fuel cells are covered including Polymer-Electrolyte Membrane (PEM) hydrogen, methanol, phosphoric acid, and solid oxide fuel cells. Integration of fuel cells with electric power and building thermal systems is examined. An integrated set of laboratory exercises provides hands-on operational experience with fuel cells and reinforces key concepts from the course. (Prerequisites: (PHYS-111 or 1017-211) or (PHYS-211 or PHYS-211A or 1017-312 or 1017-312T or 1017-389) or equivalent course. Co-requisites: EEET-354 or equivalent course.) **Lecture 3, Credits 2 (Biannual)**
- EEET-354** **Fuel Cell Systems Lab**
An integrated set of laboratory exercises provides hands-on operational experience with fuel cells and reinforces key concepts from the co-requisite course (Co-requisites: EEET-353 or equivalent course.) **Lab 2, Credits 1 (Biannual)**
- EEET-361** **Modern Audio Production**
Sound, voice, music, and effects play a critical role in telephone communication and entertainment systems. Development of integrated multi-channel acoustic information is a complex process. This course provides an intermediate level study of the technology used in recording, editing, mixing, and mastering audio. Students are introduced to core concepts and skills necessary to operate a system running large sessions with up to 48 tracks. Students will develop an appreciation of and the requisite skills to create, organize, mix, filter, process, enhance, and coordinate sound information in digital format. Topics include MIDI, virtual instruments, filtering, processing for sound enhancement, editing and adjusting time bases, mixing and mastering, and audio production. Students will develop critical listening skills as well as technical skills. (Prerequisites: EEET-261 or equivalent course.) **Lecture 3, Credits 3 (Spring)**
- EEET-421** **Design Thinking and Innovation**
This class develops skills and habits that support successful innovation and design in the workplace. A set of intense project-based learning experiences is used to drive inquiry discourse and constructive learning. Your skills in prototyping, project management, and creativity will be improved as you participate in engineering discourse including prototype reviews, classroom discussion, reading, and journal writing. The philosophy and practice of prototyping will be emphasized through exercises including creating 3D printed parts and smartphone app. The methodology of design thinking is introduced as a framework to explore contemporary innovation as a process. (Prerequisites: ((EEET-221 and EEET-222) or 0609-362) and ((CPET-251 and CPET-252) or 0618-303) or equivalent courses. Co-requisite: EEET-422 or equivalent course.) **Lecture 2, Credits 2 (Fall)**

EEET-422**Design Thinking and Innovation Lab**

Corresponding lab for course Design Thinking and Innovation (EEET-421). This class develops skills and habits that support successful innovation and design in the workplace. A set of intense project-based learning experiences is used to drive inquiry, discourse, and constructive learning. Your skills in prototyping, project management, and creativity will be improved as you participate in engineering discourse including prototype reviews, classroom discussion, reading, and journal writing. The philosophy and practice of prototyping will be emphasized through exercises including creating 3D printed parts and a smartphone app. The methodology of design thinking is introduced as a framework to explore contemporary innovation as a process. (Prerequisites: EEET-221 and EEET-222 and CPET-251 and CPET-252 or equivalent courses. Co-requisite: EEET-421 or equivalent course.) **Lab 2, Credits 1 (Fall)**

EEET-425**Digital Signal Processing**

Develops the knowledge and ability to process signals using Digital Signal Processing (DSP) techniques. Starts with foundational concepts in sampling, probability, statistics, noise, fixed and floating point number systems, and describes how they affect real world performance of DSP systems. Fundamental principles of convolution, linearity, duality, impulse responses, and discrete fourier transforms are used to develop FIR and IIR digital filters and to explain DSP techniques such as windowing. Students get an integrated lab experience writing DSP code that executes in real-time on DSP hardware. (Prerequisites: EEET-331 and EEET-332 and STAT-145 or MATH-251 or equivalent courses.) **Lab 2, Credits 4 (Spring)**

EEET-425**Digital Signal Processing**

Develops the knowledge and ability to process signals using Digital Signal Processing (DSP) techniques. Starts with foundational concepts in sampling, probability, statistics, noise, fixed and floating point number systems, and describes how they affect real world performance of DSP systems. Fundamental principles of convolution, linearity, duality, impulse responses, and discrete fourier transforms are used to develop FIR and IIR digital filters and to explain DSP techniques such as windowing. Students get an integrated lab experience writing DSP code that executes in real-time on DSP hardware. (Prerequisites: EEET-331 and EEET-332 and STAT-145 or MATH-251 or equivalent courses.) **Lecture 3, Credits 4 (Spring)**

EEET-427**Control Systems**

Develops the knowledge of control system concepts and applies them to electromechanical systems. Systems are characterized and modeled using linear systems methods, focused with a controls perspective. Impulse responses, step responses, and transfer functions are reviewed. Principles of stability and damping are developed and applied to the specification and design of open and closed loop compensators to deliver specific input-output performance. Laboratory exercises are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics. Student must register for BOTH the Lecture and Laboratory components of this course. (Prerequisites: MATH-211 or MATH-231 and (CPET-253 or (CPET-251 and CPET-252)) or (EEET-247 and EEET-248) or equivalent courses.) **Lab 2, Credits 4 (Fall, Spring)**

EEET-427**Control Systems**

Develops the knowledge of control system concepts and applies them to electromechanical systems. Systems are characterized and modeled using linear systems methods, focused with a controls perspective. Impulse responses, step responses, and transfer functions are reviewed. Principles of stability and damping are developed and applied to the specification and design of open and closed loop compensators to deliver specific input-output performance. Laboratory exercises are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics. Student must register for BOTH the Lecture and Laboratory components of this course. (Prerequisites: MATH-211 or MATH-231 and (CPET-253 or (CPET-251 and CPET-252)) or (EEET-247 and EEET-248) or equivalent courses.) **Lecture 3, Credits 4 (Fall, Spring)**

EEET-431**Transmission Lines**

Develops the knowledge and ability to analyze and design high frequency signal transmission media as applied to digital and RF systems. Topics include the propagation of electromagnetic waves on wire media; transmission line voltage, current, loss and impedance; graphical methods for analysis; transmission lines as circuit elements, application of the general transmission line equation as derived from the LC distributed model. (Prerequisites: EEET-331 and EEET-332 or equivalent courses. Co-Requisites: EEET-432 or equivalent course.) **Lecture 2, Credits 2 (Spring)**

EEET-432**Transmission Lines Lab**

Provides experience in measurement and data interpretation related to propagation of signals on transmission lines and examines the use of transmission lines as circuit elements. (Co-requisites: EEET-431 or equivalent course.) **Lab 2, Credits 1 (Spring)**

EEET-433**Transmission Lines**

Develops the knowledge and ability to analyze, design, and measure high frequency signal transmission media as applied to digital and RF systems. Topics include the propagation of electromagnetic waves on wire media; transmission line voltage, current, loss and impedance; graphical methods for analysis; transmission lines as circuit elements, application of the general transmission line equation as derived from the LC distributed model. During the course's laboratory component, students learn proper transmission line instrumentation techniques and design transmission line circuits that meet design specifications. Student must register for both the lecture and laboratory components of this course. (Prerequisite: C- or better in EEET-331 and EEET-332 or equivalent courses.) **Lab 2, Credits 3 (Spring)**

EEET-433**Transmission Lines**

Develops the knowledge and ability to analyze, design, and measure high frequency signal transmission media as applied to digital and RF systems. Topics include the propagation of electromagnetic waves on wire media; transmission line voltage, current, loss and impedance; graphical methods for analysis; transmission lines as circuit elements, application of the general transmission line equation as derived from the LC distributed model. During the course's laboratory component, students learn proper transmission line instrumentation techniques and design transmission line circuits that meet design specifications. Student must register for both the lecture and laboratory components of this course. (Prerequisite: C- or better in EEET-331 and EEET-332 or equivalent courses.) **Lecture 2, Credits 3 (Spring)**

EEET-441**Power Systems I**

Basic elements of a power system, energy sources, substation configuration, load cycles, balanced and unbalanced three-phase circuits, power factor correction, transmission line configurations and impedance, transformers and the per unit system are studied. Load flow and economic operation are introduced. (Prerequisites: (EEET-215 and EEET-216 (or 0609-411)) or (EEET-241 and EEET-242 (or 0609-337)) or equivalent course.) **Lecture 3, Credits 3 (Biannual)**

EEET-451**3D Audio: Theory and Practice**

3D audio refers to a method to generate and deliver an immersive audio field that is integrated with 3D video. The course covers theoretical and practical aspects of 3D audio: capturing auditory information of a venue using multi-microphone techniques (discrete multichannel methods, microphone arrays, and binaural capture), rendering the captured information using spatial signal processing (Inverse filtering, VBAP and Crosstalk Cancellation), transmitting and delivering as multichannel audio format, and recreating the original auditory information (multichannel loudspeaker reproduction and applying inverse filter for room compensation). In addition, the course will teach the fundamentals of the architectural acoustics (acoustics of a space) and the psycho-acoustics (recognized acoustics by listeners). The course includes practical exercises through which students can evaluate the spatial audio techniques discussed in the course and reproduce immersive multichannel sound and music. (Prerequisites: EEET-261 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

EEET-461**Introduction to Acoustics**

This course introduces the student to sound as both a physical and psychological phenomenon. The course explains the nature of sound in terms of acoustic pressure and provides an overview of how humans receive and perceive sound. Sound waves are also introduced, starting with the development of the acoustic wave equation and its solution for plane and spherical waves with harmonic sources. The concepts of acoustic intensity and acoustic impedance are presented. The course also includes study of basic sound sources as well as the absorption, reflection, scattering and diffraction of sound by various physical structures. (Prerequisites: (MATH-172 or MATH-182) and ((PHYS-111 or 1017-211) or (PHYS-211 or PHYS-211A or 1017-312 or 1017-312T or 1017-389) or equivalent courses.) **Lecture 3, Credits 3 (Biannual)**

EEET-471**Patents and Trade Secrets**

This course explores the legal characteristics and limitations of intellectual property rights protected by patents and trade secrets in the United States through study of relevant statutes, court decisions, and inventor behavior. The course is appropriate for anyone who anticipates involvement in the creation or management of intellectual property rights. NOTE: A party's legal rights depend upon their unique and specific factual situation. This course does not provide legal advice or direction. (This class is restricted to undergraduate students with at least 3rd year standing.) **Lecture 3, Credits 3 (Biannual)**

EEET-499**Cooperative Education – Electrical Engineering Technology**

One semester or summer block of appropriate work experience in a related industry. Students are required to complete a poster and presentation and participate in the ECJET co-op presentation evening at the completion of each co-op experience. Department permission is required. (Prerequisites: (CPET-253 or (CPET-251 and CPET-252)) and (EEET-313 or (EEET 311 and EEET 312)) and EEET-299 or equivalent course.) **CO OP, Credits 0 (Fall, Spring, Summer)**

EEET-520 Applied Machine Learning
Machine learning has applications in a wide variety of fields ranging from medicine and finance to telecommunications and autonomous self-driving vehicles. This course introduces machine learning and gives you the knowledge to understand and apply machine learning to solve problems in a variety of application areas. The course covers neural net structures, deep learning, support vector machines, training and testing methods, clustering, classification, and prediction with applications across a variety of fields. The focus will be on developing a foundation from which a variety of machine learning methods can be applied. Students may not take and receive credit for this course if they have already taken TCET-620. (Prerequisites: STAT-145 or equivalent course and 4th year standing. If you have earned credit for TCET-620 or you are currently enrolled in TCET-620 you will not be permitted to enroll in EEET-520.) **Lecture 3, Credits 3 (Spring)**

EEET-525 Wireless RF Systems
Develops the knowledge and ability to apply representative regulatory requirements for wireless mobile and fixed radio frequency communication systems. Topics include: the radio frequency mobile wireless environment, the common wireless systems, and regulatory aspects related to deployment of the wireless infrastructure. (Prerequisites: EEET-313 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

EEET-531 Fiber Optic Technology
This course presents the basic technologies of fiber-optic telecommunications systems including optical fiber, light sources and modulators, photodetectors and receivers, and passive components such as optical mux/demux and couplers. Students will learn the principle of operation of these technologies as well as gain practical hands-on experience in the laboratory. Students will also learn how to design and assess a fiber-optic link impaired by attenuation and dispersion. (Prerequisites: EEET-331 and EEET-332 or equivalent courses.) **Lecture 3, Credits 3 (Fall or Spring)**

EEET-541 Power Systems II
Load flow and economic operation of power systems are studied. The symmetrical component method of three-phase circuits is used for electrical fault analysis. Power system relay protection, supervisory control, power quality, and system stability are discussed. (Prerequisites: EEET-441 or equivalent course.) **Lecture 3, Credits 3 (Biannual)**

EEET-561 Audio Power Amplifiers
Develops knowledge of audio power amplifier design and audio signal measurement methods. Covers digital and analog amplifiers from high power (concert halls) to low power (cell phones and handheld digital media devices). Topics include digital sound synthesis using class D switching amplifiers, analog amplifiers, distortion, noise, stability, filtering, heatsinking, efficiency, and low power modes. (Prerequisites: EEET-221 and EEET-222 or equivalent course. Co-requisites: EEET-425 or equivalent course.) **Lab 1, Credits 3 (Biannual)**

EEET-561 Audio Power Amplifiers
Develops knowledge of audio power amplifier design and audio signal measurement methods. Covers digital and analog amplifiers from high power (concert halls) to low power (cell phones and handheld digital media devices). Topics include digital sound synthesis using class D switching amplifiers, analog amplifiers, distortion, noise, stability, filtering, heatsinking, efficiency, and low power modes. (Prerequisites: EEET-221 and EEET-222 or equivalent course. Co-requisites: EEET-425 or equivalent course.) **Lecture 2, Credits 3 (Biannual)**

EEET-598 Special Topics
Special Topics is an experimental upper-division course intended as a means for offering innovative topics not currently reflected in either the computer or electrical engineering technology curriculums. (Prerequisites: 4th year student standing in CPET or EEET and completion of at least 1 co-op block.) **Lecture 3, Credits 1 - 3 (Biannual)**

Electrical/Mechanical Engineering Technology

EMET-419 Experimental Methods for EMET
This is a course in development, documentation, and analysis of experiments needed to address open-ended technical problems. As the integrating experience for the electrical mechanical engineering technology program experiments will tightly integrate electrical and mechanical aspects of the problem statement and the problem solution as well as apply statistical methods. Non-technical skills of research, project planning, and process capability assessment are required. Experimental techniques, instrumentation and the preparation of instructions and reports are covered in this course in a project based learning environment. Students will work in groups and independently to determine and document the experimental procedures with formal technical reports along with an oral presentation. (Prerequisites: C- or better in (EMET-290 or MCET-320) or (MECE-203 and MECE-204 and MECE-205) and (STAT-145 or MATH-251) and EEET-247 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

EMET-419 Experimental Methods for EMET
This is a course in development, documentation, and analysis of experiments needed to address open-ended technical problems. As the integrating experience for the electrical mechanical engineering technology program experiments will tightly integrate electrical and mechanical aspects of the problem statement and the problem solution as well as apply statistical methods. Non-technical skills of research, project planning, and process capability assessment are required. Experimental techniques, instrumentation and the preparation of instructions and reports are covered in this course in a project based learning environment. Students will work in groups and independently to determine and document the experimental procedures with formal technical reports along with an oral presentation. (Prerequisites: C- or better in (EMET-290 or MCET-320) or (MECE-203 and MECE-204 and MECE-205) and (STAT-145 or MATH-251) and EEET-247 or equivalent courses.) **Recitation 1, Credits 3 (Spring)**

EMET-499 EMET Co-op
EMET Co-op. Department permission is required. (Prerequisites: ENGT-95 or equivalent course.) **CO OP, Credits 0**

EMET-589 Special Topics
Special topics is an experimental upper-division course intended as a means for offering innovative topics not currently reflected in the electrical mechanical engineering technology curriculum. (Prerequisites: 4th year student standing in MCET, MFET, RMET or EMET and completion of at least 1 co-op block.) **Lecture, Credits 1 - 3 (Fall, Spring, Summer)**

EMET-599 Independent Study
This course allows an upper-class electrical mechanical engineering technology student the opportunity to independently investigate, under faculty supervision, aspects of the mechanical engineering field. Proposals for an independent study must be approved by the sponsoring faculty and the MMET department chair. Students are limited to a maximum of three semester credit hours of independent study projects and two sections in any semester, and a maximum of six semester credit hours of independent study used to fulfill degree requirements. (This course is restricted to EMET-BS Major students.) **Ind Study, Credits 1 - 3 (Fall, Spring, Summer)**

Engineering Technology

ENGT-095 Career Seminar
This course is an introduction to the cooperative educational program at RIT, the programs in the department, and RIT resources. Topics include engineering technology vs. engineering, review of resources available at RIT, the cooperative education placement process, and the ethical expectations of employers for co-op students and RIT during a job search. **Seminar 1, Credits 0 (Fall, Spring)**

ENGT-110 Engineering Technology Exploration Seminar
This seminar course is designed to introduce students to the technical disciplines in the School of Engineering Technology. Students will learn about the various programs through informational sessions led by faculty from the various programs, tours, presentations by current students and alumni, and assignments developed to assist the students with exploring the different career options. Assignments will be completed both individually and in small teams. Students will be required to demonstrate oral and written communication skills. **Lec/Lab 2, Credits 1 (Fall)**

ENGT-120 Engineering Technology First Year Innovation Experience
Using a problem based learning model, students will explore foundational concepts from science, mathematics, and various engineering disciplines in the design and construction of a system targeted to address a contemporary societal need. Guided by faculty and staff from the College of Engineering Technology and external experts, students will collaborate in teams to research, plan, and implement solutions to an ill-defined, multi-disciplinary societal or technological challenge problem. Students will conduct research, innovate, hypothesize, construct arguments, and build a functioning prototype to meet design criteria. Students will develop a functional knowledge of the engineering design cycle and will better understand the challenges and benefits of teamwork in the completion of a large project. Students will regularly communicate through oral, written, formal and informal means. **Lec/Lab 4, Credits 3 (Fall)**

ENGT-189 Special Topics:
Subject offerings of new and developing areas of knowledge in intended to augment the existing curriculum. Special Topics courses are offered periodically. Watch for titles in the course listing each semester. **Lecture, Credits 1 - 4 (Fa/sp/su)**

ENGT-289 Special Topics:
Subject offerings of new and developing areas of knowledge in intended to augment the existing curriculum. Special Topics courses are offered periodically. Watch for titles in the course listing each semester. **Lecture, Credits 1 - 4 (Fa/sp/su)**

ENGT-300**Technical Workplace Professionalism**

Taught in a workshop format, this course provides an opportunity for undergraduate CET students to enhance their emotional intelligence, through assessment and if necessary, modification of personality traits and development of interaction skills. This course prepares students for success in the workplace, teaching those skills that enhance the ability to interact effectively and work harmoniously within the workplace. Students may enroll prior to working in a co-op position and/or prior to graduation and seeking employment. **Seminar 1, Credits 1 (Fall)**

ENGT-510**Undergraduate Research**

This faculty directed undergraduate research experience involves student(s) in a research project. Under the guidance of CET faculty and using one or a variety of methods, students will collect data and contribute to problem solving within a research environment. As an undergraduate research experience, emphasis is on the process of scientific research, including problem definition, formulating a research plan, data collection/analysis and interpretation based on existing research. Department permission is required. **Research 1, Credits 0 (Fall, Spring, Summer)**

ENGT-518**Global Engineering Experience**

Students will travel to a foreign country and learn about various aspects of engineering within the context of local customs, culture, and economy. Students will attend presentations and explore facilities that represent engineering disciplines in global locations. Details of the specific experience will vary and will be announced by the specific department. Students may receive credit only once per topic title. **Lecture, Credits 1 - 4**

Environmental Sustainability, Health and Safety

ESHS-100**Environmental Sustainability, Health and Safety Seminar**

This course will present the key concepts of environmental sustainability, health and safety through experiential learning and the perspective of professional practitioners. Through a series of field trips, presentations, and discussions, students will learn how EHS professionals function in the work environment. **Lecture 1, Credits 3 (Fall)**

ESHS-150**Principles of Environmental Sustainability, Health and Safety**

This course presents an overview of the principles of environmental sustainability, health and safety that allows students to think critically about current environmental sustainability, health and safety issues. (This course is restricted to students in the ESHS-BS program.) **Lecture 3, Credits 3 (Spring)**

ESHS-151H**Sustainable Water Resources**

The World Health Organization estimates that 1 in 8 people do not have access to a safe drinking water supply. The US State Department has stated that armed conflict over water rights is possible on many of the world's river systems including the Nile, Tigris/Euphrates, Brahmaputra-Jamuna, and Mekong. What is the cause of these problems, and how will changes to the hydrologic cycle and world water supply brought about by climate change affect them? Students will learn about the hydrologic cycle, the general characteristics of surface water and groundwater, and global patterns of water use. Students will learn about the health, economic, and social consequences of drought and flooding, and the effect climate change is having on water supply in arid countries. Laws and government regulation of water withdrawal and use will be covered, as will techniques to extend the available water supply. Students will consider the positive and negative consequences of increasing the sustainability of the water supply through efficiency, conservation, inter-basin transfer, water use export, grey & black water reuse, urban runoff capture, and the creation of fresh water through desalination. Written and oral communication skills will be emphasized. Students will form teams to debate ethical issues related to equitable distribution of our limited water supply. The course will have one text, but learning materials will be strongly supplemented using documentaries, online videos and electronic and print journalism articles to elucidate the popular understanding of our water crisis. Students who complete this course may not take ESHS-360 (Sustainable World Water Supply) for credit. **Lecture 3, Credits 3 (Fall)**

ESHS-200**Environmental Geology**

An introduction to geology from an environmental geology perspective, including topics related to sustainability of geologic resources. Basic geology topics include earth materials and internal forces. Environmental topics include erosion, mass wasting, river systems, and environmental sampling. Sustainability of earth resources is explored, including strategic and industrial minerals, and the long-term viability of fossil fuels. (Prerequisites: Enrollment in this class is restricted to students in ESHS-BS or ENV-S only. Co-requisites: ESHS-201 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

ESHS-201**Environmental Monitoring and Measurement I**

This laboratory course provides students with skills used in geologic investigations and investigations of contaminated sites. Students will learn to describe and analyze surficial and shallow subsurface geological features, and to plan, execute, and interpret sampling events. (Prerequisites: CHMG-141 and CHMG-145 or equivalent courses. Co-requisites: ESHS-200 or equivalent course.) **Lec/Lab 3, Credits 2 (Fall)**

ESHS-210**Sustainable Earth Resources**

An introduction to geology from an earth resources-economic geology perspective, focusing on sustainability of green energy resources. Basic geology topics include earth materials, internal forces, and surface processes. Environmental topics include soil and water resources. Sustainability of earth resources is explored, including strategic and industrial minerals, long-term viability of fossil fuels, and the sustainability of minerals crucial for renewable energy production and storage. The course will also explore ethical issues associated with fossil fuel use, conflict mineral extraction, the uneven distribution of benefits associated with Earth resource extraction, and the uneven distribution of negative consequences, both environmental and social, of Earth resource extraction. Scientific and ethical questions will be discussed throughout the course. (Co-requisites: ESHS-BS and ESHS-201 or any other program.) **Lecture 3, Credits 3 (Fall)**

ESHS-225**Construction Safety**

This course is designed to cover construction health and safety hazards and will study OSHA regulations in depth. Students get to handle and investigate construction safety issues, the OSHA standards addressing trench excavation, scaffolding, temporary electric circuits, fall protection, HAZCOM, underground construction are studied. **Lecture 3, Credits 3 (Spring)**

ESHS-250**Introduction to Hydrology**

This course will cover most subdisciplines within the broad field of hydrology. Students will learn the theoretical background, and practical applications of selected aspects of the science including the hydrologic cycle, surface water calculations, vadose zone flow, groundwater hydraulics, groundwater monitoring, water chemistry, and groundwater contaminant transport. The class culminates in an investigation of a mock contaminated site in which the students apply aspects of all of the above mentioned topics. Hydrology has important applications for environmental managers, and these applications will be highlighted in the class. (Prerequisites: (PHYS-111 or PHYS-211 or PHYS-211A) and ESHS-200 or equivalent courses. Co-requisites: ESHS-251 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

ESHS-251**Environmental Monitoring and Measurement II**

This laboratory course provides students with skills used in hydrologic investigations and investigations of contaminated sites. Students will learn field skills to support surface water investigations, groundwater investigations, and investigations of contaminated sites. Students will also learn to specify sampling any chemical analysis for contaminated sites, and to use common air and water quality field analytical instruments. (Prerequisites: ESHS-201 or equivalent course. Co-requisites: ESHS-250 or equivalent course.) **Lab 3, Credits 2 (Spring)**

ESHS-251**Environmental Monitoring and Measurement II**

This laboratory course provides students with skills used in hydrologic investigations and investigations of contaminated sites. Students will learn field skills to support surface water investigations, groundwater investigations, and investigations of contaminated sites. Students will also learn to specify sampling any chemical analysis for contaminated sites, and to use common air and water quality field analytical instruments. (Prerequisites: ESHS-201 or equivalent course. Co-requisites: ESHS-250 or equivalent course.) **Recitation 1, Credits 2 (Spring)**

ESHS-290**Social Responsibility and Environmental Sustainability**

This course will introduce social responsibility concepts and approaches presented in key documents like the ISO 26000 Social Responsibility Standard and the Universal Bill of Human Rights, and will explore the web of relationships in which an organization or a community exists, with the objective of providing the foundational knowledge necessary to plan a strategy for closing the gap between the activities, products and services of the organization or community and the ecosystem within which it exists. **Lecture 3, Credits 3 (Spring)**

ESHS-300**Environmental, Health and Safety Professional Communication**

Communication of environmental sustainability health and safety (EHS) information and issues is critical for awareness, information, and action. Students develop skill in reporting and conveying EHS and scientific information internally to the organization and externally to the public or regulating agencies. Students also gain an understanding of the role of the media and public relations in the environmental communication process. Students learn strategies and formats for communicating safety information, especially in procedures and instructional materials. Writing and speaking skills are sharpened for successful business, media and crisis communication. (Prerequisite: UWRT-150 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

ESHS-310**Solid and Hazardous Waste Management**

An examination of strategies and technologies to move an organization toward environmental sustainability, including resource use reduction, material substitution, process and product modification, and waste minimization; and for handling and managing wastes including treatment, storage, transport, and disposal storing solid and hazardous waste. Associated environmental impacts, regulatory concerns, technical feasibility, and costs are considered. (Prerequisites: ESHS-150 and CHMG-141 and CHMG-142 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

College of Engineering Technology

- ESHS-320 Occupational Safety**
This course is an overview of the occupational safety management tools and techniques utilized in today's industry. Topics examined include OSHA requirements, record keeping, guarding, electrical safety material handling, welding, fire prevention, excavation, medical surveillance, worker's compensation, inspection techniques, auditing, committees, incentives, and voluntary programs. (Co-requisites: ESHS-150 and CHMG-141 and PHYS-111 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**
- ESHS-330 Industrial Wastewater Management**
This course investigates characteristics and sources of industrial wastewaters, related environmental impacts, regulatory implications, and technical considerations of current treatment and disposal methodologies. Students learn to identify appropriate methods, technologies, and sequences for source reduction, treatment and pretreatment, direct discharge, and management of treatment residuals. (Prerequisites: ESHS-150 and CHMG-141 and CHMG-142 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**
- ESHS-350 Greenhouse Gas Management**
Climate change has been recognized as the fundamental problem of the 21st century, and the anthropogenic cause of climate change has been established. This course will introduce the scientific basis of the greenhouse effect, the global carbon cycle and climate change and will identify and explore methods used to determine an organization's GHG output. Mechanisms used by industry, governmental organizations and commercial enterprises to remain competitive as the world transitions to a low carbon economy will be explored. Students will gain GHG inventorying skills presented in ISO 14064 and the WRI Greenhouse Gas Protocol, and will gain fundamental understanding of the causes, effects, and possible mitigation strategies for climate change. **Lecture 3, Credits 3 (Spring)**
- ESHS-360 Sustainable World Water Supply**
The World Health Organization estimates that one in eight people do not have access to a safe drinking water supply. The U.S. State Department has stated that armed conflict over water rights is possible on many of the world's river systems including the Nile, Tigris/Euphrates, Brahmaputra-Jamuna, and Mekong. What is the cause of these problems and how will changes to the hydrologic cycle and world water supply brought about by climate change affect them? Students will learn about the hydrologic cycle, the general characteristics of surface water and groundwater, and global patterns of water use. Students will learn about the health, economic, and social consequences of drought and flooding, and the effect climate change is having on water supply in arid countries. Laws and government regulation of water withdrawal and use will be covered, as will techniques to extend the available water supply. Students will consider the positive and negative consequences of increasing the sustainability of the water supply through efficiency, conservation, inter-basin transfer, water use export, grey and black water reuse, urban runoff capture, and the creation of fresh water through desalination. **Lecture 3, Credits 3 (Fall)**
- ESHS-370 Sustainable Food Systems**
Food is a powerful lever to optimize human health and environmental sustainability on Earth. However, problems associated with food and our food production systems are currently threatening both people and planet. An immense challenge facing humanity is to provide a growing world population with healthy diets that are based on ethically managed and sustainable food systems. While global food production has generally kept pace with population growth, more than 820 million people still lack sufficient food, and many more consume either low-quality diets or too much food. To have any hope of meeting the central goal of the Paris Climate Agreement, which is to limit global warming to 2°C or less, our carbon emissions from agriculture and food waste must be significantly reduced. This course will examine the sustainability and ethical issues and weaknesses in our current global food system. Key topics will include the ethical failures and environmental impacts of different agricultural practices; the ethics of patenting seeds and developing GMO crops reliant on harmful pesticides; how processed food and packaging impact the environment; the social, health and environmental effects of various diets; how climate change is impacting agriculture; and ultimately how can we meet the nutritional needs of the planet in an ethical and sustainable manner. **Lecture 3, Credits 3 (Fall)**
- ESHS-460 EHS Accident Causation and Prevention**
Historical as well as modern accident and incident causation models and theories will be covered. Students will learn how to identify and prevent unsafe acts and conditions that can lead to accidents and incidents. The application of management system controls, including operational controls to prevent accidents and incidents, will be reviewed. In addition, students will learn how to investigate accidents and incidents. They will also learn how to develop accident and incident investigation written programs. (Prerequisites: ESHS-320 or equivalent course and at least 4th year standing in the ESHS-BS program.) **Lecture 3, Credits 3 (Fall)**
- ESHS-480 EHS Law**
An overview of environmental, health and safety (EHS) related law with an emphasis on legislative law. Topics include a review of the historical and modern sources for EHS law, the emergence of administrative law and the responsibilities of the separate branches of government. Major EHS related legislation will be covered. (This class is restricted to undergraduate students with at least 4th year standing.) **Lecture 3, Credits 3 (Spring)**
- ESHS-489 Special Topics**
Subject offerings of new and developing areas of knowledge in environmental sustainability, health and safety intended to augment the existing curriculum. Special topics courses are offered periodically. Watch for titles in the course listing each semester. **Lecture, Credits 1 - 4**
- ESHS-499 ESHS Co-op**
ESH S Co-op. Department permission is required. (Prerequisites: ENGT-95 or equivalent course.) **CO OP, Credits 0**
- ESHS-501 Fire Protection**
Introduces fundamental concepts in protection of industrial workers and property from fire and explosion. Fire chemistry, control of ignition sources in industry, and properties of combustible materials are discussed. Fire detection and extinguishment are covered along with building construction for fire prevention, life safety, fire codes, and related topics. This course is co-listed with ESHS-601; students may receive credit for ESHS-501 or ESHS-601, not both. (Students cannot take and receive credit for this course if they have taken ESHS-601.) **Lecture 3, Credits 3 (Fall)**
- ESHS-511 Occupational Health**
This course will provide students with the fundamentals of industrial hygiene and public health. Emphasis will be on the toxicological effects of various chemical, biological, and physical insults on the body, monitoring and personal sampling for these substances, personal protection, and controls against such substances will be covered. This course is co-listed with ESHS-611; students may receive credit for ESHS-511 or ESHS-611, not both. (Prerequisites: ESHS-150 and CHMG-141 and BIOL-101 and BIOL-103 or equivalent courses. Students may not take and receive credit for this course if they have already taken ESHS-611.) **Lecture 3, Credits 3 (Fall)**
- ESHS-512 Occupational Health Lab**
Weekly labs and associated reports develop skills and understanding of calibration and use of air sampling equipment and other instrumentation to assess workplace health hazards. Hands-on practical hazardous material response. Students who complete the course will receive OSHA HAZWOPER 40 hour certification. (Prerequisites: CHMG-141 or equivalent course. Co-requisite: ESHS-511 or equivalent course.) **Lab 2, Credits 1 (Fall)**
- ESHS-515 Corporate EHS Management**
Presents the fundamentals of how companies manage their environmental, health and safety issues. EHS motivations and strategies for corporate EHS management will be explored. Organizational considerations for managing corporate EHS programs will be identified. Total quality management and its applications to corporate EHS problem solving will be introduced. The basic elements of EHS management systems will be reviewed. EHS training and corporate EHS reporting will also be examined. (Prerequisites: ESHS-460 and ESHS-480 or equivalent courses and 5th year standing in the ESHS-BS program.) **Lecture 3, Credits 3 (Fall, Spring)**
- ESHS-525 Air Emissions Management**
This course will present an overview of industrial air pollution management, its sources, methods of reduction, control, and management. Students will become familiar with the history of air pollution, the chemistry and effects of pollutants, regulations and standards, and control technologies as well as developing analytical and quantitative skills necessary in air emissions management decision-making. This course is co-listed with ESHS-615; students may receive credit for ESHS-525 or ESHS-615, not both. (Prerequisites: ESHS-150 and (CHMG-141 or CHMG-111) or equivalent courses. Students cannot take and receive credit for this course if they have taken ESHS-615.) **Lecture 3, Credits 3 (Spring)**
- ESHS-526 Exposure Assessment and Analysis**
The course focuses on industrial hygiene applications and hands on participation. Particular attention will be given to sampling strategies, from similar exposure grouping, actual sampling experiences with a wide range of industrial hygiene instruments, and sampling analysis using statistical protocols. Field experience with instrumentation, as well as professional written and oral communication of results is emphasized. There are several out of classroom learning experiences required (team-based). (Prerequisites: ESHS-340 or equivalent course.) **Lec/ Lab 4, Credits 3 (Fall, Spring)**
- ESHS-530 Mechanical and Electrical Safeguarding**
Discussion of machine safety with emphasis on hazard analysis, risk estimation, safeguarding techniques, and electrical safety. Particular attention will be paid to applicable OSHA, ANSI, NFPA, and EN standards as they relate to wood, metal, films, and automation. Elements of the course will change regularly to reflect emerging issues in industry. This course is co-listed with ESHS-630; students may receive credit for ESHS-530 or ESHS-630, not both. (Students cannot take and receive credit for this course if they have taken ESHS-630.) **Lecture 3, Credits 3 (Fall, Spring)**

ESHS-544 Remedial Investigation and Corrective Action
Describes the sequence of events required to investigate, conduct feasibility studies, and identify appropriate corrective actions at hazardous waste sites. Explains the process flow logistics, concepts, and rationale behind each action. Explores current issues of how clean is clean? Students learn to develop conceptual site characterization plans, effective RI/CA proposals, review and evaluate work plans, procedures and operations plans, and contingency plans (Prerequisites: ESHS-310 and ESHS-330 and ESHS-350 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

ESHS-550 Project Management
This course has been designed to give the student an overview of the fundamental concepts of modern project management. Areas of focus include the project life cycle (PLC), the project management body of knowledge (PMBOK), program evaluation review technique (PERT), critical path method (CPM), and various budgeting and resource allocation techniques. Discussion of project management organizations, negotiation, conflict resolution, and project termination will be included, along with an introduction to Project Management Institute (PMI) and Microsoft Project for Windows. (This course is restricted to students in the ESHS-BS program.) **Lecture 3, Credits 3 (Spring)**

ESHS-565 Sustainable Product Stewardship
This course examines the principles of sustainable product stewardship, including the ethical, legal, and economic issues that product manufacturers face as well as the relationship between products and sustainability. Students will learn and apply some environmental sustainability, health and safety analysis techniques used to identify and manage product environmental sustainability aspects as well as health and safety hazards. Students will use case studies to examine the concept of product stewardship management through product life cycle thinking and extended producer responsibility. (Students who have completed ESHS-665 Product Stewardship may not receive credit for this course.) **Lecture 3, Credits 3 (Summer)**

ESHS-590 Capstone Project
This is a faculty-designed capstone team project course for 5th year ESHS students. It presents students with one or more identified EHS need(s) and challenges them to work together to plan, schedule, and carry out a project to design and develop socially responsible and environmentally sustainable solutions. The project may vary from offering to offering reflecting current trends and developments. (Prerequisites: ESHS-290 or equivalent course and 5th year standing in the ESHS-BS program.) **Project 3, Credits 3 (Spring)**

Human Resource Development

HRDE-380 Human Resource Management
Human resources within an organization provide value added dimensions to the organization, which in turn influence the larger society within which the organization exists. The management of those human resources is a critical function within any organization. The goal of the human resource management (HRM) department is to attract qualified employees, manage systems that meet their needs and establish policies and protocols to retain and promote employee engagement. This effort develops a workforce that can meet the organizational strategic goals for growth and continued relevance in the world of work. This course provides an overview of HRM and the context within which HRM functions in organizations. **Lecture 3, Credits 3 (Fall, Spring)**

HRDE-383 Employee Benefits and Compensation
A total rewards program within an organization develops and aligns a reward strategy for employees to reinforce the behavior and performance required to support the organizations overall strategy. This course identifies what rewards are, both tangible and intangible, including compensation and benefits. Using the information a rewards program is built reflecting existing business conditions and cost constraints. This program is used as an organizational strategy to satisfy personal and financial needs of the current and future workforce. **Lecture 3, Credits 3 (Spring)**

HRDE-386 Human Resources Development
A one-semester, three-credit course in human resource development provides the prospective manager practical information on methods to enhance the productivity, quality, and effectiveness of an organization through the creation of an environment where individual and collective performance and development has primacy. The course requires students to assimilate course material related to the following: to organizational strategy, systems thinking and legal compliance; workforce development, career development of employees; individual development and training; measuring outcomes; human resource processes and effective communications. Students integrate theoretical classroom concepts with practical knowledge and work experiences. As part of the course: students continually practice effective communication skills; students may work in teams; and are expected to engage in critical and innovative thinking. Students' understanding of human resource development is intended to help them enhance organizational effectiveness through implementing processes designed to develop and train employees. **Lecture 3, Credits 3 (Fall, Spring)**

HRDE-387 Human Resource Employment Law and Regulations
Employment law and regulations govern how the workforce functions. Adherence to the law can raise questions due to context of the situation and applicability of the law to a variety of situations. This course will explain employment laws and regulations as they apply to a variety of workplaces and interpret how these laws and regulations require compliance through the practice of human resource management. **Lecture 3, Credits 3 (Fall)**

Manufacturing Engineering Technology

MFET-420 Quality Engineering Principles
This course is designed to introduce the student to techniques required to maintain and improve quality within manufacturing organizations and the service sector through the use of statistical methodologies. The course covers concepts of quality, quality managements and assurance, product quality, design of quality control chart, statistical process control, and quality improvement through design by considering concept development and implementation. Traditional and modern quality systems will be discussed including the work of such quality gurus like Taguchi, Deming, Juran, and Shewhart. (Prerequisites: STAT-145 or STAT-205 or STAT-251 or MATH-251 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

MFET-436 Engineering Economics
This course provides in depth coverage of engineering economic analysis, which is the financial side of engineering decision making. Students are also taught ethical decision making through an introduction to an engineering professional code of conduct. Project planning/management are introduced to students. Presentation skills are enhanced with an emphasis on presenting to executives. (Prerequisites: Completion of MATH-111 or any other higher level MATH class is required.) **Lecture 3, Credits 3 (Fall, Spring)**

MFET-450 Lean Production and Supply Chain Operations
This course is designed to provide the student with knowledge and skills of contemporary theories and practices in operations and supply chain management employed by world class manufacturing organizations. Students are introduced to topics that include forecasting, aggregate planning, inventory management, capacity management, and supply chain management. Integrated with these topics are lean excellence tools VSM, 5S, Kanban, OEE and Standard Work Practices, Cycle Time Analysis. (Prerequisites: STAT-145 or STAT-205 or STAT-251 or MATH-251 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

MFET-460 Integrated Design for Manufacture and Assembly
Integrated design for manufacture and assembly manufacturing processes are expanded and applied to the design process. Part concepts will be considered for various manufacturing processes to determine which process will yield the lowest cost part that meets all product functional requirements. Students will learn the DFMA methodology for making decisions to analyze the costs associated with their product concepts. Designs will consider the tooling that is required in product build and will understand the interrelationships between decisions and the cost associated with manufacture and service of the product. At the conclusion of the course students will be able to effectively design parts and assemblies for manufacture, assembly, and service. Costing will be considered at every step of the design process. (Prerequisites: MFET-120 or NETS-120 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MFET-499 MFET Co-op
One semester of experience in a job related to the student's major. Completion of Co-op Orientation required before registering for co-op. Department permission is required. (Prerequisites: ENGT-95 or equivalent course.) **CO OP, Credits 0**

MFET-545 Electronics Manufacturing
This course provides a thorough understanding of the technology, components, equipment, materials and manufacturing process for through hole technology and surface mount technology electronics manufacturing. Students will develop a strong foundation needed for advanced work in surface mount technology (SMT). Topics in Design for Manufacturing are also considered for high volume vs. low volume manufacturing. Students may only receive credit for this course or MFET-655, not both. (Students cannot take and receive credit for this course if they have taken MFET-655.) **Lecture 3, Credits 3 (Fall)**

MFET-545 Electronics Manufacturing
This course provides a thorough understanding of the technology, components, equipment, materials and manufacturing process for through hole technology and surface mount technology electronics manufacturing. Students will develop a strong foundation needed for advanced work in surface mount technology (SMT). Topics in Design for Manufacturing are also considered for high volume vs. low volume manufacturing. Students may only receive credit for this course or MFET-655, not both. (Students cannot take and receive credit for this course if they have taken MFET-655.) **Recitation 1, Credits 3 (Fall)**

MFET-556 **Advanced Concepts in Semiconductor Packaging**
The advanced course in semiconductor packaging will provide a thorough coverage of the materials, processes, failure, and reliability of chip level packaging. Specific topics include single-chip, multi-chip, wafer level and 3D stacked packaging, photonic integrated chip (PIC), smaller passives and embedded passive component technology, advanced substrates and micro-via technology, solder technologies, metallurgy and joint formation, thermal management, thermal and mechanical behavior of packaging, failure analysis, and reliability testing. This course is cross listed with MFET-656 students may receive credit for MFET-556 or MFET-656, not both. (Prerequisites: MFET-545 or equivalent course. Students cannot take and receive credit for this course if they have taken MFET-656.) **Lecture 3, Credits 3 (Spring)**

MFET-586 **Robots and Automation Lab**
This laboratory course provides hands on experience with robotics and CNC in manufacturing. (Co-requisites: MFET-585 or equivalent course.) **Lab 2, Credits 1 (Fall)**

MFET-590 **Production Systems Development**
MFET-580 Production Systems Design and MFET-590 Production Systems Development together form manufacturing engineering technology senior project. This course is project-based. In MFET-590 students construct a fully functioning automated work cell that produces a finished packaged product. Students will also practice project management, project planning and effective communication while drawing on their past technical skills (e.g. Solid works) to complete the project. Students are tasked to use an integrated design, problem-solving process development, and assembly techniques in the completion of a fully functional automated work-cell and product. Process improvement becomes inherent in the integrated activities. Design, final documentation, and demonstration of successful fully functional automated workcell and assembly of a product are required. (Prerequisites: MFET-340 and MFET-341 and MFET-445 and MFET-446 and MFET-460 or equivalent courses. Co-requisites: MFET-580 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

Mechanical Engineering Technology

MCET-099 **Mechanical Fundamentals of Engineering (FE) Exam Preparation**
This non-credit bearing optional course helps to prepare students for the Fundamentals of Engineering (FE) exam. Material in the mechanical engineering discipline is emphasized. Much of the class time is devoted to problem solving, and students have ample practice in working through practical problems in mechanical engineering as they prepare for the FE examination. The FE exam is the first step in the process leading to the Professional Engineers (PE) license. This review class is open only to CET 4th and 5th year engineering technology students or instructor permission. ****Class fee is required**** (This class is restricted to students with at least 4th year standing in CVET-BS, ESHS-BS, CPET-BS, EEET-BS, TCET-BS, EMET-BS, MCET-BS, MFET-BS, RMET-BS or PACK-BS.) **Seminar 3, Credits 0 (Spring)**

MCET-101 **Fundamentals of Engineering**
Students will apply engineering problem solving methods used in industry to complete projects involving engineering topics such as mechanics, circuits, robotics, and thermodynamics. Software tools are used to model their designs, perform design calculations, collect and analyze data. Finally, students will present their work professionally using both written and oral communication software. The goal of the class is to have students become familiar with the many aspects of mechanical engineering through hands on, experiential learning and prepares them to work professionally and effectively in a team setting both in college and in industry. **Lecture 3, Credits 3 (Fall, Spring)**

MCET-101 **Fundamentals of Engineering**
Students will apply engineering problem solving methods used in industry to complete projects involving engineering topics such as mechanics, circuits, robotics, and thermodynamics. Software tools are used to model their designs, perform design calculations, collect and analyze data. Finally, students will present their work professionally using both written and oral communication software. The goal of the class is to have students become familiar with the many aspects of mechanical engineering through hands on, experiential learning and prepares them to work professionally and effectively in a team setting both in college and in industry. **Recitation 1, Credits 3 (Fall, Spring)**

MCET-110 **Foundations of Metals**
This class explores the commonly used engineering metals. Differentiation of materials, with a focus on metals, is made based on an understanding and control of fundamental material properties. This knowledge of properties and materials then informs analysis of which metals are selected for various applications. Corrosion and its mitigation are explored. Materials selection software and internet resources are used. (Prerequisites: This class is restricted to MCET-BS or MECA-BS or RMET-BS or EMET-BS or ENGTEH-UND students. Corequisites: MCET-111 or equivalent course.) **Lecture 2, Credits 2 (Fall, Spring)**

MCET-111 **Characterization of Metals Lab**
This lab class accompanies MCET-110 Foundations of Materials. An emphasis is placed on determining material, primarily metals, properties through experimentation and references, and analyzing why a particular material was selected for an application based on the materials properties. Differentiation of materials families is made based on properties. A variety of discovery activities are used to explore the world of metals, including labs of various types, materials selection software, and internet resources. (Co-requisites: MCET-110 or equivalent course.) **Lab 1, Credits 1 (Fall, Spring)**

MCET-149 **Overview of Geometric Dimensioning and Tolerancing**
This course provides transfer students who have solid modeling experience an introduction to geometric dimensioning & tolerancing (GD&T). This course, combined with CET-MCET-148 Essentials of Solid Modeling, is equivalent to CET-MCET-150 Engineering Design Communication. (Prerequisite: MCET-148 or equivalent course.) **Lecture 14, Credits 1**

MCET-150 **Engineering Communication and Tolerancing**
A course that integrates basic engineering techniques. Topics will emphasize the design and communication of components through the use of hand sketching, solid modeling, dimensioning, tolerancing, and current GD&T standards. Students will be expected to design, build, inspect, and integrate GD&T into designs. (This class is restricted to MCET-BS or MECA-BS or RMET-BS or EMET-BS or ENGTEH-UND students.) **Lecture 3, Credits 3 (Spring)**

MCET-150 **Engineering Communication and Tolerancing**
A course that integrates basic engineering techniques. Topics will emphasize the design and communication of components through the use of hand sketching, solid modeling, dimensioning, tolerancing, and current GD&T standards. Students will be expected to design, build, inspect, and integrate GD&T into designs. (This class is restricted to MCET-BS or MECA-BS or RMET-BS or EMET-BS or ENGTEH-UND students.) **Recitation 1, Credits 3 (Spring)**

MCET-210 **Foundations of Non-Metallic Materials**
This course will cover the process of selecting a best material for a given design application with a focus on polymeric materials. To support this process material families, strengthening mechanisms, and degradation mechanisms and prevention will be studied. The materials selection process will include economic, ecological, and ethical considerations. An emphasis is placed on the interrelationship of structure, process, and properties. This class expands upon concepts presented in MCET-110. (Prerequisites: C- or better in (CHMG-131 or CHMG-141 or CHEM-151) and (MCET-110 and MCET-111) or (NETS-110 and NETS-111) or (MECE-304 or MECE-305 and MECE-306) or equivalent courses. Corequisite: MCET-211 or equivalent course.) **Lecture 2, Credits 2 (Fall, Spring)**

MCET-211 **Characterization of Non-Metallic Materials Lab**
This course will consist of laboratory experiences which focus on property characterization of the properties of polymeric materials. (Co-requisites: MCET-210 or equivalent course.) **Lab 2, Credits 1 (Fall, Spring)**

MCET-220 **Principles of Statics**
This course provides an introduction to the analysis and design of structures and machines. Students learn to calculate unknown forces using the concept of equilibrium and free body diagrams and to calculate simple stresses and deflections for axially loaded members. Topics include forces, moments, free body diagrams, equilibrium, friction, stress, strain, and deflection. Examples are drawn from mechanical, manufacturing, and civil engineering technology. **Lecture 3, Credits 3 (Fall, Spring)**

MCET-220 **Principles of Statics**
This course provides an introduction to the analysis and design of structures and machines. Students learn to calculate unknown forces using the concept of equilibrium and free body diagrams and to calculate simple stresses and deflections for axially loaded members. Topics include forces, moments, free body diagrams, equilibrium, friction, stress, strain, and deflection. Examples are drawn from mechanical, manufacturing, and civil engineering technology. **Recitation 1, Credits 3 (Fall, Spring)**

MCET-221 **Strength of Materials**
This course provides an introduction to the analysis and design of structures and machines. Students learn to calculate stresses and deflections in axially loaded members, beams, shafts, and columns. Topics include statically indeterminate problems, thermal stress, stress concentration, combined stress by superposition, and Mohr's Circle. Students also gain experience with teamwork, project management, and communications as they complete recitation and project assignments. (Prerequisites: Grade of C- or better in MCET-220 or MECE-103 or CVET-210 or equivalent course. Co-requisite: MCET-110 or NETS-110 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

MCET-221**Strength of Materials**

This course provides an introduction to the analysis and design of structures and machines. Students learn to calculate stresses and deflections in axially loaded members, beams, shafts, and columns. Topics include statically indeterminate problems, thermal stress, stress concentration, combined stress by superposition, and Mohr's Circle. Students also gain experience with teamwork, project management, and communications as they complete recitation and project assignments. (Prerequisites: Grade of C- or better in MCET-220 or MECE-103 or CVET-210 or equivalent course. Co-requisite: MCET-110 or NETS-110 or equivalent course.) **Recitation 1, Credits 3 (Fall, Spring)**

MCET-320**Mechanical Dynamics with Applications**

Principles of engineering dynamics and the solution of practical engineering problems using engineering dynamics are studied. The dynamic analysis of particles and rigid bodies are performed using the three fundamental analytical methods. These include Force-Acceleration, Work-Energy, and Impulse-Momentum methods. An emphasis is placed on the application of these methods to the solution of real engineering problems. In addition, this course introduces the study of vibration in a mass, spring, and damper system. Students will evaluate real problems experimentally, analytically and through computer simulation. (Prerequisites: C- or better in MCET-220 or MECE-103 or CVET-150 or equivalent course. Co-Requisite: MATH-211 or MATH-231 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

MCET-320**Mechanical Dynamics with Applications**

Principles of engineering dynamics and the solution of practical engineering problems using engineering dynamics are studied. The dynamic analysis of particles and rigid bodies are performed using the three fundamental analytical methods. These include Force-Acceleration, Work-Energy, and Impulse-Momentum methods. An emphasis is placed on the application of these methods to the solution of real engineering problems. In addition, this course introduces the study of vibration in a mass, spring, and damper system. Students will evaluate real problems experimentally, analytically and through computer simulation. (Prerequisites: C- or better in MCET-220 or MECE-103 or CVET-150 or equivalent course. Co-Requisite: MATH-211 or MATH-231 or equivalent course.) **Recitation 1, Credits 3 (Fall, Spring)**

MCET-330**Fluid Mechanics and Fluid Power**

This course involves the study of the basics of fluid mechanics and fluid power. Areas of study include pressure, forces, viscosity, bulk modulus, flow characterization, efficiency and losses. Fluid Power systems and components are also reviewed including hydraulic/pneumatic systems, pumps, compressors, actuators, valves, accumulators, and directional control valves. (Prerequisites: C- or better in MCET-220 or MECE-103 or CVET-210 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

MCET-330**Fluid Mechanics and Fluid Power**

This course involves the study of the basics of fluid mechanics and fluid power. Areas of study include pressure, forces, viscosity, bulk modulus, flow characterization, efficiency and losses. Fluid Power systems and components are also reviewed including hydraulic/pneumatic systems, pumps, compressors, actuators, valves, accumulators, and directional control valves. (Prerequisites: C- or better in MCET-220 or MECE-103 or CVET-210 or equivalent course.) **Recitation 1, Credits 3 (Fall, Spring)**

MCET-400**Experimental Methods for MCET**

This is a course in development, documentation, and analysis of experiments needed to address technical problems assigned as projects. Experimental techniques, instrumentation, and the preparation of instructions and reports are covered in this course in a project based learning environment. Experiments will utilize principles of engineering (including mechanics and materials) and statistics. Students will work in groups and independently to document the experimental procedures with formal technical reports along with an oral presentation. (Prerequisites: Grades of C- or better in (MCET-221 or (MCET-203 and MCET-204)) and (MCET-320 or MECE-205) and (STAT-145 or MATH-251) or equivalent courses.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

MCET-400**Experimental Methods for MCET**

This is a course in development, documentation, and analysis of experiments needed to address technical problems assigned as projects. Experimental techniques, instrumentation, and the preparation of instructions and reports are covered in this course in a project based learning environment. Experiments will utilize principles of engineering (including mechanics and materials) and statistics. Students will work in groups and independently to document the experimental procedures with formal technical reports along with an oral presentation. (Prerequisites: Grades of C- or better in (MCET-221 or (MCET-203 and MCET-204)) and (MCET-320 or MECE-205) and (STAT-145 or MATH-251) or equivalent courses.) **Recitation 1, Credits 3 (Fall, Spring)**

MCET-430**Thermal Fluid Science I**

This course provides an introduction to the properties of pure substances, gas laws, first law of thermodynamics, along with an introduction to fluid mechanics are studied and applied. Students learn through an integrated presentation of thermodynamics and fluid mechanics how to approach and solve reasonable thermal-fluid problems. Topics include the first law of thermodynamics, specific heat, ideal gases, work, energy, lumped systems, fluid statics, conservation of mass/energy, laminar, and turbulent flow. Examples are drawn from mechanical, and electrical mechanical engineering technology. (Prerequisites: Grade of C- or better in PHYS-112 or PHYS-212 equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

MCET-430**Thermal Fluid Science I**

This course provides an introduction to the properties of pure substances, gas laws, first law of thermodynamics, along with an introduction to fluid mechanics are studied and applied. Students learn through an integrated presentation of thermodynamics and fluid mechanics how to approach and solve reasonable thermal-fluid problems. Topics include the first law of thermodynamics, specific heat, ideal gases, work, energy, lumped systems, fluid statics, conservation of mass/energy, laminar, and turbulent flow. Examples are drawn from mechanical, and electrical mechanical engineering technology. (Prerequisites: Grade of C- or better in PHYS-112 or PHYS-212 equivalent course.) **Recitation 1, Credits 3 (Fall, Spring)**

MCET-450**Mechanical Analysis and Design I**

In this course students will investigate how mechanical parts fail through static, fatigue, and surface modes. Students will analyze the stresses, apply failure theories, and design mechanical components to last. The fatigue characteristics for given metal samples will be investigated through experimentation, analysis, and deduction of experimental results. The computer is used extensively in analysis, FEA, and design process. (Prerequisites: Grades of C- or better in (MCET-221 or (MECE-203 and MECE-204)) and (MCET-320 or MECE-205) or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

MCET-488**Special Topics with Laboratory**

Special Topics is an experimental upper-division course intended as a means for offering innovative topics not currently reflected in the mechanical engineering technology curriculum. Course includes a laboratory component. (Prerequisites: 4th year student standing in MCET, MFET, RMET or EMET and completion of at least 1 co-op block.) **Lab, Credits 1 - 3 (Fa/sp/su)**

MCET-488**Special Topics with Laboratory**

Special Topics is an experimental upper-division course intended as a means for offering innovative topics not currently reflected in the mechanical engineering technology curriculum. Course includes a laboratory component. (Prerequisites: 4th year student standing in MCET, MFET, RMET or EMET and completion of at least 1 co-op block.) **Lecture, Credits 1 - 3 (Fa/sp/su)**

MCET-489**Special Topics**

Subject offerings of new and developing areas of knowledge in the mechanical engineering technology curriculum. Special topics courses are offered periodically. Watch for titles in the course listing each semester. **Lecture 2, Credits 1 - 3 (Fall, Spring)**

MCET-499**MCET Co-op**

One semester of appropriate work experience in industry. Department permission is required. (Prerequisites: ENGT-95 or equivalent course.) **CO OP, Credits 0**

MCET-520**Measurement Systems and Controls**

This course examines modeling, instrumentation, and measurement of electrical, mechanical, fluid, and thermal systems containing elements such as sensors and actuators used in feedback control systems. Analytical and experimental techniques of general importance in systems engineering are presented, including sensor utilization in feedback control. Engineering measurement fundamentals, including digital and frequency domain techniques noise and error analysis are covered. Closed-loop system analysis will include the use of proportional, integral, and derivative elements to control system response. Hands-on projects and laboratories are utilized to reinforce fundamental measurement and control system concepts. Software skills include the use of MATLAB and the graphical programming language, LABVIEW. (Prerequisites: (MATH-211 or MATH-231) and (EET-115 and EET-116) and (MCET-320 or EMET-290 or (MECE-203 and MECE-204 and MECE-205)) and (STAT-145 or STAT-205 or MATH-251).) **Lab 2, Credits 3 (Fall, Spring)**

MCET-520 Measurement Systems and Controls
 This course examines modeling, instrumentation, and measurement of electrical, mechanical, fluid, and thermal systems containing elements such as sensors and actuators used in feedback control systems. Analytical and experimental techniques of general importance in systems engineering are presented, including sensor utilization in feedback control. Engineering measurement fundamentals, including digital and frequency domain techniques noise and error analysis are covered. Closed-loop system analysis will include the use of proportional, integral, and derivative elements to control system response. Hands-on projects and laboratories are utilized to reinforce fundamental measurement and control system concepts. Software skills include the use of MATLAB and the graphical programming language, LABVIEW. (Prerequisites: (MATH-211 or MATH-231) and (EET-115 and EET-116) and (MCET-320 or EMET-290 or {MECE-203 and MECE-204 and MECE-205}) and (STAT-145 or STAT-205 or MATH-251).) **Lecture 2, Credits 3 (Fall, Spring)**

MCET-521 Structural Analysis
 This course will provide a thorough understanding of beam structures under combined shear, bending and torsional loads. Topics include the study of semi-monocoque structure idealizations, effects of tapered and laminated structures, and torsion of multi-cell sections. Matrix methods are introduced and utilized throughout the course. The course has a project component that combines analytical and experimental methods. Students may receive credit for only this course or MCET-621, not both. (Prerequisites: MCET-221 and MATH-231. Also, students cannot take and receive credit for this course if they have taken MCET-621) **Lecture 3, Credits 3 (Spring)**

MCET-521 Structural Analysis
 This course will provide a thorough understanding of beam structures under combined shear, bending and torsional loads. Topics include the study of semi-monocoque structure idealizations, effects of tapered and laminated structures, and torsion of multi-cell sections. Matrix methods are introduced and utilized throughout the course. The course has a project component that combines analytical and experimental methods. Students may receive credit for only this course or MCET-621, not both. (Prerequisites: MCET-221 and MATH-231. Also, students cannot take and receive credit for this course if they have taken MCET-621) **Recitation 1, Credits 3 (Spring)**

MCET-530 Thermal Fluid Science II
 This course provides an in-depth coverage on the application of the first and second law of thermodynamics and conservation principles, mass and energy, to the analysis of open systems and power cycles, including refrigeration, heat pump and power cycles. It also introduces the fundamentals of heat transfer theory, conduction, radiation, free and forced convection, and its application to heat exchangers including free surface and conduit flow. Case studies based on real-world thermal systems are used to illustrate the connection between these interdisciplinary subjects. (Prerequisites: C- or better in MCET-430 or (MECE-210 and MECE-211) or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

MCET-530 Thermal Fluid Science II
 This course provides an in-depth coverage on the application of the first and second law of thermodynamics and conservation principles, mass and energy, to the analysis of open systems and power cycles, including refrigeration, heat pump and power cycles. It also introduces the fundamentals of heat transfer theory, conduction, radiation, free and forced convection, and its application to heat exchangers including free surface and conduit flow. Case studies based on real-world thermal systems are used to illustrate the connection between these interdisciplinary subjects. (Prerequisites: C- or better in MCET-430 or (MECE-210 and MECE-211) or equivalent course.) **Recitation 1, Credits 3 (Fall, Spring)**

MCET-535 Thermal Fluid Systems Project
 Students perform laboratory experiments in thermodynamics, fluid mechanics, and heat transfer. Students will do a group project involving the design, modification, and analysis of a Thermo-Fluid system, its instrumentation, method of test, data analysis and final report presentation. Special emphasis is placed on report preparation and computer-aided data reduction. (Co-requisites: MCET-530 or equivalent course.) **Lecture 2, Credits 2 (Fall, Spring)**

MCET-550 Mechanical Analysis and Design II
 All machines are comprised of individual components (springs, gears, fasteners, etc.) working together as a system to accomplish a goal. This course integrates the components into the bigger picture of the system. The course culminates in the design and production of a machine. (Prerequisites: C- or better in MCET-450 or equivalent course. Corequisites: MCET-551 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MCET-551 Mechanical Analysis and Design II Lab
 This course will allow students to demonstrate and develop the skills and knowledge gained in the MCET-550 Mechanical Analysis and Design II course. This will be done through the integration of course topics into lab projects. These labs will allow students to analyze and design mechanical systems that include gears, springs, shafts, bearings, and other forms of power transmission. The lab will be split between in class discussions and hands-on learning opportunities. In class discussions will outline lab requirements and relate the lab-to-course material. Lab reports are generated through the integration of word processing and presentation software. The application of software tools and the engineering design process will be emphasized throughout. (Corequisites: MCET-550 or equivalent course.) **Lab 2, Credits 1 (Spring)**

MCET-560 Alternative Energy
 A technical introduction to alternative energy systems in the context of energy economics and conventional energy sources. Topics include solar thermal, PV, wind, ocean current and tides, geothermal, biomass, and fuel cells. Project in the course will allow students to develop and test an alternative energy system, component or device. Course is intended as first course in alternative energy for MET students. (Co-requisites: MCET-530 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MCET-561 Multiphysics Modelling: Materials, Components, and Systems
 Multiphysics modeling is the study of multiple interacting and coupled physical phenomena including heat transfer, fluid flow, deformation, electromagnetics, acoustics, and mass transport. Students will use numerical methods, specialized software, and computer simulations to solve engineering problems and understand the underlying physics of interacting complex engineering systems. This course may be cross-listed with MCET-661; BSMS program students are advised to enroll in the graduate level course. (Prerequisites: (MATH-211 or MATH-231) and MCET-430 or equivalent courses. Co-requisites: MCET-530 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

MCET-561 Multiphysics Modelling: Materials, Components, and Systems
 Multiphysics modeling is the study of multiple interacting and coupled physical phenomena including heat transfer, fluid flow, deformation, electromagnetics, acoustics, and mass transport. Students will use numerical methods, specialized software, and computer simulations to solve engineering problems and understand the underlying physics of interacting complex engineering systems. This course may be cross-listed with MCET-661; BSMS program students are advised to enroll in the graduate level course. (Prerequisites: (MATH-211 or MATH-231) and MCET-430 or equivalent courses. Co-requisites: MCET-530 or equivalent course.) **Recitation 2, Credits 3 (Fall)**

MCET-562 Advanced Fluid Mechanics and Modeling
 The main purpose of this course is to help students develop a mastery of the underlying principles and the ability to efficiently solve a variety of real fluid dynamics problems. The course focuses on the physical phenomena, mathematical formulations, and advanced problem-solving techniques and modeling for flows ranging from laminar incompressible flows to turbulence, with examples from mechanical engineering practice and technology. This course may be cross-listed with MCET-662; BSMS program students are advised to enroll in the graduate level course. (Prerequisites: (MATH-211 or MATH-231) and MCET-430 or equivalent courses. Co-requisites: MCET-530 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

MCET-562 Advanced Fluid Mechanics and Modeling
 The main purpose of this course is to help students develop a mastery of the underlying principles and the ability to efficiently solve a variety of real fluid dynamics problems. The course focuses on the physical phenomena, mathematical formulations, and advanced problem-solving techniques and modeling for flows ranging from laminar incompressible flows to turbulence, with examples from mechanical engineering practice and technology. This course may be cross-listed with MCET-662; BSMS program students are advised to enroll in the graduate level course. (Prerequisites: (MATH-211 or MATH-231) and MCET-430 or equivalent courses. Co-requisites: MCET-530 or equivalent course.) **Recitation 2, Credits 3 (Spring)**

MCET-563 Power Plants
 An introduction to industrial electric power generation and distribution. Students will learn about the different types of electric generating plants: steam cycle, combined cycle, gas turbine, diesel, and hydraulic. The electric power grid in North America will be introduced along with new distribution technologies such as smart grid and high voltage DC. Environmental impacts of all generation processes will be discussed. Regulations and economic aspects of the industry will also be a topic in this course. Field trips to generating plants will be a required part of this course. (Co-requisites: MCET-530 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MCET-567 Energy Management for HVAC Systems
 This course employs professional practice to the design of comfort conditioning systems for building environments. The thermodynamics and processes of air heating, cooling, filtering, ventilating, humidity control, and the heat transfer of envelopes and the system components required are developed. Those elements and systems are studied in the context of required professional practices and relevant codes to optimize systems and components performance. (Co-requisites: MCET-530 and MCET-568 or equivalent courses.) **Lecture 2, Credits 2 (Spring)**

MCET-568**Energy Management for HVAC Lab**

This course employs professional practice to the design of comfort conditioning systems for building environments. The thermodynamics and processes of air heating, cooling, filtering, ventilating, humidity control, and the heat transfer of envelopes and the system components required are developed. Those elements and systems are studied in the context of required professional practices and relevant codes to optimize systems and components performance. (Co-requisites: MCET-530 and MCET-567 or equivalent courses.) **Lab 1, Credits 1 (Spring)**

MCET-569**Machinery Vibration**

This course expands students' machine design capabilities to include the effects of vibration. The basic concepts of vibration and noise are covered. Emphasis is placed on machinery design to minimize vibration and the use of vibration and noise for machinery condition monitoring. Environmental tests for vibration, shock, and noise are performed. Measurement tools and computer analysis tools are utilized. (Prerequisites: MCET-320 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

MCET-574**Plastics and Composites Materials**

Study of advanced polymeric materials including their preparation, processing and application design. Topics will include both long and short fiber reinforced composites. Industrial modification of polymers into plastics compounds including polymer blends and additives will also be discussed. Students may receive credit for only this course or MCET-674, not both. (Prerequisites: MCET-210 or equivalent course. Students cannot take and receive credit for this course if they have taken MCET-674. Corequisites: MCET-575 or equivalent course.) **Lecture 2, Credits 2 (Fall)**

MCET-575**Plastics and Composites Materials Laboratory**

Laboratory exercises involving polymeric materials (e.g. composites, polymers blends) including their preparation, processing and application design. Students may receive credit for only this course or MCET-675, not both. (Students cannot take and receive credit for this course if they have taken MCET-675. Co-requisites: MCET-574 or equivalent course.) **Lab 2, Credits 1 (Fall)**

MCET-578**Welding Principles**

This course introduces students to the macroscopic and microscopic aspects of different types of welding. Students will experience and learn different welding techniques such as MIG, TIG, Stick, and Oxyacetylene welding. Actual practice with the latest technologies such as MIG and TIG will reinforce concepts and provide practical hands-on experience. Several sample test parts will be welded in a lab and broken with a tensile tester to evaluate the calculated load compared to the welded joint strength. Weld samples will also be microscopically inspected to determine the HAZ (heat affected zone) of the material. Oxyacetylene and plasma cutting will be experienced. Interpreting weld symbols on drawings will be learned and applied. **Possible lab fee associated with this course.** (This class is restricted to undergraduate students with at least 3rd year standing.) **Lecture 3, Credits 3 (Fall, Spring)**

MCET-580**Plastics Manufacturing Technology**

The course introduces fundamentals in plastic materials and processing technology to manufacture various plastic products in plastics industry. The course emphasizes new materials and process selections for engineering applications and design. (Prerequisites: MCET-210 or equivalent course and this class is restricted to students in MCET-BS or EMET-BS or MFET-BS or RMET-BS.) **Lecture 3, Credits 3 (Fall)**

MCET-582**Robust Design**

The fundamental principles of robust design are developed. The history of the robust design engineering methodology is presented. The concepts of the loss function, concept selection, parameter design, and tolerance design will be covered. Metrics and analysis techniques are developed to optimize the performance of product or process components in spite of their design, manufacturing, or customer use environments. Specific attention will be paid to a number of case studies to reinforce the student's conceptualization of the methods and their focus on engineering of optimized products and processes. Students may not take and receive credit for this course if they have already taken MCET-620. (Students cannot take and receive credit for this course if they have taken MCET-620.) **Lecture 3, Credits 3 (Fall, Spring)**

MCET-583**Plastics Product Design**

The study of design guidelines for plastic products based on the interrelationships between design, the material selected, the manufacturing process selected, and the tooling to be used. Students may not take and receive credit for this course if they have already taken MCET-683. (Prerequisites: MCET-210 and MCET-211 or equivalent courses. Students cannot take and receive credit for this course if they have taken MCET-683.) **Lecture 3, Credits 3 (Spring)**

MCET-585**Product Ideation**

Students learn the process of generating and formulating an idea, developing a Voice of the Customer (VOC) survey, utilizing a House of Quality (HOQ) matrix for developing a product requirements document, brainstorming and ranking concepts through the Plough Concept Selection Matrix technique, among others. Patenting and intellectual property issues will be discussed and selected ideas will be evaluated against patent searches. (This class is restricted to students with at least 3rd year standing in MCET-BS, MFET-BS, RMET-BS, EMET-BS or PACK-BS.) **Lecture 3, Credits 3 (Fall)**

MCET-586**Product Innovation**

Product innovation of new consumer products is accomplished by using a multi-step process in inter-disciplinary teams. Students will benefit from experiencing these steps/roles as they prepare to develop an idea into a product for commercialization. In this course, students will learn to take an idea of a feasible design and develop a detailed product definition to meet consumer known and/or unknown needs using a variety of industry standard processes and methodologies like Stage Gate, Design Thinking and Lean Startup Thinking. The students will further evaluate the marketplace, apply engineering standards from previous core courses and develop a presentation, report and prototype for the final deliverables. (A minimum of 3rd year standing is required to enroll.) **Lecture 3, Credits 3 (Spring)**

MCET-588**Special Topics with Laboratory**

Special Topics is an experimental upper-division course intended as a means for offering innovative topics not currently reflected in the mechanical engineering technology curriculum. Course includes a laboratory component. (Prerequisites: 4th year student standing in MCET, MFET, RMET or EMET and completion of at least 1 co-op block.) **Lab, Credits 1 - 3 (Fa/sp/su)**

MCET-588**Special Topics with Laboratory**

Special Topics is an experimental upper-division course intended as a means for offering innovative topics not currently reflected in the mechanical engineering technology curriculum. Course includes a laboratory component. (Prerequisites: 4th year student standing in MCET, MFET, RMET or EMET and completion of at least 1 co-op block.) **Lecture, Credits 1 - 3 (Fa/sp/su)**

MCET-589**Special Topics**

Special Topics is an experimental upper-division course intended as a means for offering innovative topics not currently reflected in the mechanical engineering technology curriculum. (Prerequisites: 4th year student standing in MCET, MFET, RMET or EMET and completion of at least 1 co-op block.) **Lecture, Credits 1 - 3 (Fall, Spring, Summer)**

MCET-590**Dynamics of Machinery**

Students learn to solve kinematic and dynamic analysis problems for planar mechanisms with applications ranging from manufacturing equipment to consumer products and the automotive field. Both analytical and computer simulation methods are used. (Prerequisites: MCET-320 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

MCET-592**Spray Theory and Application**

This course covers the theory necessary to understand spray formation and evolution, as well as a host of spray applications. Knowledge of differential equations is required. Topics include drop size distributions, breakup of liquid sheets and ligaments, drop formation and breakup, drop motion and the interaction between a spray and its surroundings, drop evaporation, nozzle internal fluid mechanics, external spray characteristics, nozzle performance, and experimental techniques relevant to these subjects. Applications will include: (1) gas turbine engines, (2) internal combustion engine sprays, (3) sprays for geo-engineering, (4) agricultural sprays, (5) consumer products, (6) paints and coatings, and (7) use of non-traditional liquids in aero-propulsion and other systems. Time spent on each topic depends on student interest. Each student is expected to work on a final project, of their choosing, focused on a topic within the realm of spray theory and application. Students may take and receive credit for MCET-592 or MCET-692, not for both. (Prerequisites: (MCET-430 or MECE-210 or BIME-320) and (MATH-231 or MATH-211) and at least 4th year standing. Students cannot take and receive credit for this course if they have taken MCET-692.) **Lecture 3, Credits 3 (Fall)**

MCET-595**Applied Finite Element Analysis**

This course focuses on using commercial finite element analysis (FEA) software to analyze linear and non-linear systems in the areas of structural mechanics and heat transfer. Students will utilize a wide variety of analysis techniques including deflection, stress, mode shapes, optimization, heat transfer, and thermal-stress. In addition, projects using FEA to solve problems of interest to the student are required. Students may not take and receive credit for this course if they have already taken MCET-695. (Prerequisites: MFET-221 or EMET-290 or equivalent course. Students cannot take and receive credit for this course if they have taken MFET-695.) **Lecture 3, Credits 3 (Fall)**

MCET-599

Independent Study

This course allows an upper-class mechanical engineering technology student the opportunity to independently investigate, under faculty supervision, aspects of the mechanical engineering field. Proposals for an independent study must be approved by the sponsoring faculty and the MMET department chair. Students are limited to a maximum of three semester credit hours of independent study projects and two sections in any semester, and a maximum of six semester credit hours of independent study used to fulfill degree requirements. (This course is restricted to MCET-BS Major students.) **Ind Study, Credits 1 - 3 (Fall, Spring)**

Mechatronics

MECA-290

Mechanics for Mechatronics

This course provides an introduction to the analysis and design of structures and machines, with applications to mechatronic components and systems. Students learn to calculate stresses and deflections in axially loaded members, beams, shafts, and columns. Topics include statically indeterminate problems, thermal stress, stress concentration, combined stress by superposition and Mohr's Circle, thin-walled pressure vessels, columns and structure stability. The fundamentals of kinematics and kinetics of particle motion are developed including the study of Newton's Laws of Motion, energy methods, impulse and momentum. Students also gain experience with laboratory equipment, experimental methods, team work, project management and communications as they complete laboratory and project assignments. Analysis and design principles are applied to mechatronic components and systems. (Prerequisites: C- or better in MCET-220 or MECE-103 or CVET-210 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

MECA-290

Mechanics for Mechatronics

This course provides an introduction to the analysis and design of structures and machines, with applications to mechatronic components and systems. Students learn to calculate stresses and deflections in axially loaded members, beams, shafts, and columns. Topics include statically indeterminate problems, thermal stress, stress concentration, combined stress by superposition and Mohr's Circle, thin-walled pressure vessels, columns and structure stability. The fundamentals of kinematics and kinetics of particle motion are developed including the study of Newton's Laws of Motion, energy methods, impulse and momentum. Students also gain experience with laboratory equipment, experimental methods, team work, project management and communications as they complete laboratory and project assignments. Analysis and design principles are applied to mechatronic components and systems. (Prerequisites: C- or better in MCET-220 or MECE-103 or CVET-210 or equivalent course.) **Recitation 1, Credits 3 (Fall, Spring)**

MECA-436

Engineering Economics

This course provides coverage of the financial side of engineering decisions relating to product development and operations. Course topics provide a foundation for engineers to effectively analyze engineering systems and operations with respect to financial considerations of product development, analysis, and operations. This course prepares students for the Fundamentals of Engineering (FE) Examination, Engineering Economics section. **Lecture 2, Credits 2 (Fall, Spring)**

MECA-518

Mechatronics ET Capstone Prep

This is the first of a two-course sequence for Mechatronics Capstone Project where students address open-ended problems. Emphasis is placed on teamwork, the design process, and project management tools addressing project scope, schedule, risk, cost, milestones and deliverables. The course also focuses on developing good oral, written and interpersonal communication skills. In this course, student teams develop their proposed final mechatronics system after identifying customer needs, and possible alternative concepts. The final system design must be supported by sound engineering analyses and by engineering designs necessary to build a prototype to be implemented in MECA-519. This course is intended to be taken as a capstone design experience near the conclusion of the student's program of study. (Prerequisites: (EMET-290 or (MCET-221 and MCET-320)) and (STAT-145 or MATH-251) or equivalent courses. Co-requisite: EEET-427 or equivalent course.) **Lec/Lab 2, Credits 1 (Fall)**

MECA-519

Mechatronics ET Capstone

This is the second of the two-course sequence for Mechatronics Capstone project where students demonstrate the proposed problem resolution developed in MECA-518. Focus is on design implementation, analysis, testing, documentation, demonstration, and presentation of a fully functional prototype. Continued emphasis is placed on teamwork and on developing good oral, written and interpersonal communication skills. (Prerequisites: MECA-518 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

Media Arts and Technology

MAAT-010

Co-op Orientation

This course provides students with a venue for preparing for job searches and subsequent employment. Students learn how to access the RIT job search database, to prepare cover letters and resumes, to make efficient use of career fairs, and to participate in effective interviews through a mock interview process. (This course is restricted to students in the NMEP-BS program.) **Seminar 1, Credits 0 (Fall, Spring)**

MAAT-101

Cross Media Foundations

This course introduces students to the graphic media industry by studying its history, culture, technologies, markets and workers. The course provides an orientation to production concepts, working environments, hardware and software tools, languages, working standards and cultures of the industry. **Lab 3, Credits 3 (Fall, Spring)**

MAAT-101

Cross Media Foundations

This course introduces students to the graphic media industry by studying its history, culture, technologies, markets and workers. The course provides an orientation to production concepts, working environments, hardware and software tools, languages, working standards and cultures of the industry. **Lecture 2, Credits 3 (Fall, Spring)**

MAAT-102

Introduction to Graphic Media

Graphic media is customized manufacturing driven by exciting digital technologies and innovative applications resulting in provocative output using varied processes. This course introduces learners to the graphic media industry by completing hands-on projects that will orient them to the technologies and processes required to complete a diverse array of graphic projects, including conventional and digital printing, premedia processes, typography, and image processing. Projects include preparing text and images and subsequent output for screen printing, flexographic printing, offset lithographic printing, inkjet and other digital printing, signage, and cross-media through print, web, and mobile. Learners will develop an appreciation to the unique contributions of graphic media to society. **Lab 2, Credits 1 (Fall, Spring)**

MAAT-106

Typography and Page Design

The course provides an introduction to the theoretical and practical foundations of typography and page design. Students study the history, aesthetics, and technology of typography, and current methods of page composition. Projects include design and production methods, using current software tools and fonts for typography in print and monitor display. Students will apply their acquired knowledge to make informed decisions in the practice of typography and page composition. (Prerequisites: MAAT-101 or equivalent course.) **Lab 2, Credits 3 (Spring)**

MAAT-106

Typography and Page Design

The course provides an introduction to the theoretical and practical foundations of typography and page design. Students study the history, aesthetics, and technology of typography, and current methods of page composition. Projects include design and production methods, using current software tools and fonts for typography in print and monitor display. Students will apply their acquired knowledge to make informed decisions in the practice of typography and page composition. (Prerequisites: MAAT-101 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

MAAT-107

Imaging

This course covers skills and competencies necessary to create, manage and edit digital images. Students work with digital hardware, software, and learn relevant terminology. Various processes of image reproduction from acquisition to manipulation, and output of optimized files are addressed. **Lab 2, Credits 3 (Fall)**

MAAT-107

Imaging

This course covers skills and competencies necessary to create, manage and edit digital images. Students work with digital hardware, software, and learn relevant terminology. Various processes of image reproduction from acquisition to manipulation, and output of optimized files are addressed. **Lecture 2, Credits 3 (Fall)**

MAAT-108

Raster and Vector Imaging

Impactful images are essential for nearly all forms of effective graphic communication. The theme of this project-based course is the creation and optimization of raster and vector images for cross-media deployment through print, web, and mobile media. Through a series of hands-on, laboratory-based exercises, learners employ professional image evaluation and editing techniques in preparation for commercial output. Using current software and computer peripherals, learners apply industry best practices to produce, evaluate, and optimize digital raster and vector images. **Lab 3, Credits 3 (Spring)**

MAAT-108**Raster and Vector Imaging**

Impactful images are essential for nearly all forms of effective graphic communication. The theme of this project-based course is the creation and optimization of raster and vector images for cross-media deployment through print, web, and mobile media. Through a series of hands-on, laboratory-based exercises, learners employ professional image evaluation and editing techniques in preparation for commercial output. Using current software and computer peripherals, learners apply industry best practices to produce, evaluate, and optimize digital raster and vector images. **Lecture 2, Credits 3 (Spring)**

MAAT-206**Print Production**

This survey course introduces students to the technologies of print production, with a focus on the materials and processes used in conventional, digital, and functional printing methods. Hands-on lab experiences expose students to the underlying concepts while imparting knowledge of the strengths and limitations of the various methods. Quality, efficiency, economics, and sustainability are addressed. (Prerequisites: MAAT-101 or equivalent course.) **Lab 3, Credits 3 (Spring)**

MAAT-206**Print Production**

This survey course introduces students to the technologies of print production, with a focus on the materials and processes used in conventional, digital, and functional printing methods. Hands-on lab experiences expose students to the underlying concepts while imparting knowledge of the strengths and limitations of the various methods. Quality, efficiency, economics, and sustainability are addressed. (Prerequisites: MAAT-101 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

MAAT-223**Production Workflow**

This course focuses on planning and producing cross-media projects. Students gain hands-on experience with all phases of production through a series of print and new media projects. Concepts of content and production management are applied with an emphasis on creating quality outcomes that are delivered on-budget and on-time. (Prerequisites: MAAT-101 or equivalent course.) **Lec/Lab 4, Credits 3 (Spring)**

MAAT-256**Principles of Printing**

This course surveys the materials and processes used in print reproduction. Students will learn the basic theory of image reproduction embodied in the analog and digital printing processes, and learn to identify the process origins of print samples. Additionally, students will be introduced to material science as it relates to print. **Lecture 3, Credits 3 (Summer)**

MAAT-266**Advanced Workflow**

This advanced course focuses on analysis of production workflow efficiencies, process automation, and process optimization with an emphasis on the steps involved in producing, publishing, promoting, and packaging. Students gain direct experience with advanced workflow tools through immersive projects. (Prerequisite: MAAT-271 or ISTE-105 or equivalent course.) **Lab 3, Credits 3 (Spring)**

MAAT-266**Advanced Workflow**

This advanced course focuses on analysis of production workflow efficiencies, process automation, and process optimization with an emphasis on the steps involved in producing, publishing, promoting, and packaging. Students gain direct experience with advanced workflow tools through immersive projects. (Prerequisite: MAAT-271 or ISTE-105 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

MAAT-267**Paginated Graphic Workflow**

Graphic media on an enterprise level requires efficient and automated workflows to complete printed projects efficiently, mistake-free, on-time, and on-budget. This course focuses on workflows for the two main printed output technologies for paginated pages: offset lithography and high-volume digital printing. Building on the understanding of the requisite steps entailed of these two key output processes, this hands-on course encompasses all of the processes that allow graphic media companies to go from concept to completion while minimizing manual steps to ensure that efficiency is built into an optimized and flexible workflow. Emphasis is placed on project management, stakeholder communications, bottleneck identification, and building efficiencies as related to paginated output for offset lithography and high-volume digital printing technologies. **Lab 2, Credits 3 (Spring)**

MAAT-267**Paginated Graphic Workflow**

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MAAT-271**Webpage Production I**

Students in this course will plan and implement publishing projects with a focus on usability, accessibility, and information design for the World Wide Web. Application of standard Web protocols such as HTML and CSS will be applied in the context of Web publishing as a part of a cross-media production strategy. (This course is restricted to students in the NMEP-BS or JOURNAL-BS programs.) **Lecture 3, Credits 3 (Fall)**

MAAT-272**Webpage Production II**

In this advanced course, students will apply concepts and skills from previous study to determine optimal strategies for the development, deployment and evaluation of complex websites. Through a blend of research and practical application, students will evaluate and apply a range of methodologies for Web publishing. (Prerequisite: MAAT-271 or ISTE-105 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MAAT-300**Typography and Culture in Northern Italy**

This course will explore the history of typography while providing students with a cross-cultural outlook important to understanding the innovation of typography today. Students will examine typography's rich history and the revolution of type in northern Italy and investigate how history can inspire innovation. The course will cover typographic and design history along with Italian history and culture. The course will review contemporary practices, projects and research in typography. The travel abroad will include visits to typographic museums, lectures, guest speakers, and hands-on experiences as students explore typography across cultures. This is a study abroad course and travel expenses will be incurred for this course. Instructor approval required. **Study Abroad, Credits 3 (Summer)**

MAAT-301**Database Publishing**

Database publishing is centered on personalized graphic communications: this entails customizing graphic messaging for individuals and specifically targeted audiences. The requisite competencies for database publishing, including managing and accessing databases and integrating digital assets for distribution using electronic and digitally-printed methods, form the core of this course. Learners work with the fundamental design elements of databases constructed for activities that support graphic communication processes. Topics include best practices for building, optimizing, and maintaining databases comprised of recipient information and the merging of data with managed digital assets. Projects include composing publications and creating personalized documents for distribution through the web and in print. (Prerequisites: MAAT-106 and MAAT-271 or equivalent courses) **Lab 2, Credits 3 (Spring)**

MAAT-301**Database Publishing**

Database publishing is centered on personalized graphic communications: this entails customizing graphic messaging for individuals and specifically targeted audiences. The requisite competencies for database publishing, including managing and accessing databases and integrating digital assets for distribution using electronic and digitally-printed methods, form the core of this course. Learners work with the fundamental design elements of databases constructed for activities that support graphic communication processes. Topics include best practices for building, optimizing, and maintaining databases comprised of recipient information and the merging of data with managed digital assets. Projects include composing publications and creating personalized documents for distribution through the web and in print. (Prerequisites: MAAT-106 and MAAT-271 or equivalent courses) **Lecture 2, Credits 3 (Spring)**

MAAT-302**Professional and Technical Writing**

This course prepares students to engage in a variety of written and oral communications necessary in academic and business environments with an emphasis on technical writing. Students are expected to produce appropriate audience-centered written materials that achieve a desired purpose based on techniques, organization, format, and style. Formal technical reports and presentations are required. Students must pass this course with a grade of B or higher prior to graduation or pass the Writing Competency Test. (Prerequisites: Completion of First Year Writing (FYW) requirement is required prior to enrolling in this class.) **Lecture 3, Credits 3 (Fall, Spring)**

MAAT-306**Information Architecture Publishing**

In this course the students will research current and emerging publishing information technology trends and apply them in creating publishing solutions across a variety of platforms. Students will learn and apply digital asset management methods and practices in real-world scenarios. (Prerequisites: MAAT-106 and MAAT-272 or ISTE-305 or equivalent courses.) **Lab 2, Credits 3 (Spring)**

MAAT-306**Information Architecture Publishing**

In this course the students will research current and emerging publishing information technology trends and apply them in creating publishing solutions across a variety of platforms. Students will learn and apply digital asset management methods and practices in real-world scenarios. (Prerequisites: MAAT-106 and MAAT-272 or ISTE-305 or equivalent courses.) **Lecture 2, Credits 3 (Spring)**

College of Engineering Technology

MAAT-307

Media Business Management

This course introduces principles in core business areas, such as management, finance, accounting, operations, and marketing, which are key factors in developing, growing, and operating a media venture. **Lecture 3, Credits 3 (Fall)**

MAAT-355

Media Law

Media Law offers an opportunity to investigate the philosophical and constitutional foundations of free expression as it relates to speech, writing, image making and publishing. First Amendment principles are studied with respect to personal protection boundaries. The course will provide a survey covering defamation issues. Students should be able to form educated opinions about libel and slander boundaries. Since the publication discipline involves the creation of original work, a study of copyright, patent and trademark law is emphasized. **Lecture 3, Credits 3 (Fall, Spring)**

MAAT-356

Strategies in Multimedia

This course will examine the structure and channels of advertising, publishing, and packaging. It focuses on marketing communications across a range of graphic media. Mass media and customized technologies for effectively reaching consumers will be explored. Emphases are on the development of an optimized mix of marketing communications techniques for the goals of a particular project. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 3, Credits 3 (Fall, Spring)**

MAAT-359

Media Distribution and Transmission

In this course students gain extensive knowledge of the various methods and techniques used to electronically and physically distribute information. Students will also study planning, scheduling, inventory management, and customer fulfillment. (Prerequisites: MAAT-101 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

MAAT-363

Media Industries Analysis

This course examines the major industries closely allied with the printing industry including advertising, publishing, and packaging. The intent is to give students in-depth knowledge of (1) the structure of each of these industries; (2) the channels and methods through which and by which each distributes its products and services; and (3) the major customers of its products and services. Particular attention will be devoted to investigating the business models for the use of print to create value in advertising, publishing, and packaging. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 3, Credits 3 (Spring)**

MAAT-364

Digital News Systems Management

This course examines the evolving forms and functions of news media publishing. The focus is on the intersections of the various systems necessary for contemporary news publishing: information technology, content management, audience assessment, human resource management, and product delivery. **Lecture 3, Credits 3 (Spring)**

MAAT-365

Automation and Scripting for Graphic Media

When completing print and graphic media projects on an industrial-scale, efficient and effective automation and scripting strategies are integral to productivity and competitiveness. In this course, learners develop and implement automation schemas specific for the print and graphic media industry. Hands-on assignments begin with automation methodologies imbedded in commonly used software (e.g.: Adobe Photoshop and Illustrator Actions.) Scripting is introduced as students utilize markup languages such as XML and object-oriented languages such as Python and prototype-based object oriented languages such as JavaScript to further specific automated tasks through inter-application communication. Emphasis is placed on strategies such as automating digital asset management tasks and using scripting to accomplish advanced variable-data graphic media tasks in a real-world context. Learners implement automation and scripting to improve performance, efficiency, and consistency in print and graphic media production. (Prerequisites: MAAT-301 or equivalent course.) **Lab 2, Credits 3 (Spring)**

MAAT-365

Automation and Scripting for Graphic Media

When completing print and graphic media projects on an industrial-scale, efficient and effective automation and scripting strategies are integral to productivity and competitiveness. In this course, learners develop and implement automation schemas specific for the print and graphic media industry. Hands-on assignments begin with automation methodologies imbedded in commonly used software (e.g.: Adobe Photoshop and Illustrator Actions.) Scripting is introduced as students utilize markup languages such as XML and object-oriented languages such as Python and prototype-based object oriented languages such as JavaScript to further specific automated tasks through inter-application communication. Emphasis is placed on strategies such as automating digital asset management tasks and using scripting to accomplish advanced variable-data graphic media tasks in a real-world context. Learners implement automation and scripting to improve performance, efficiency, and consistency in print and graphic media production. (Prerequisites: MAAT-301 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

MAAT-368

Gravure and Flexography

Students will explore gravure and flexography technologies, and learn to evaluate applicable designs. Extensive hands-on experience is included. Students will create pressure sensitive label designs, take command of a flexo press, and print labels. **Lab 3, Credits 3 (Spring)**

MAAT-368

Gravure and Flexography

Students will explore gravure and flexography technologies, and learn to evaluate applicable designs. Extensive hands-on experience is included. Students will create pressure sensitive label designs, take command of a flexo press, and print labels. **Lecture 2, Credits 3 (Spring)**

MAAT-371

Print Finishing Management

This course explains and demonstrates why planning for successful print finishing requires in-depth knowledge of production from design planning through prepress, print, bindery, and distribution operations. Emphasis is placed on cost-effective planning, management, and control in a contemporary print-finishing environment. (Prerequisites: MAAT-101 or equivalent course.) **Lab 3, Credits 3 (Spring)**

MAAT-371

Print Finishing Management

This course explains and demonstrates why planning for successful print finishing requires in-depth knowledge of production from design planning through prepress, print, bindery, and distribution operations. Emphasis is placed on cost-effective planning, management, and control in a contemporary print-finishing environment. (Prerequisites: MAAT-101 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

MAAT-376

Lithographic Process

This course provides detailed fundamentals of the equipment and materials used in the lithographic process for both sheetfed and web presses. Topics include plates, blankets, press, inks, substrates, and pressroom management. There is an emphasis on process color printing, problem solving on press, and process variables that impact quality and productivity. **Lab 3, Credits 3 (Fall, Spring)**

MAAT-376

Lithographic Process

This course provides detailed fundamentals of the equipment and materials used in the lithographic process for both sheetfed and web presses. Topics include plates, blankets, press, inks, substrates, and pressroom management. There is an emphasis on process color printing, problem solving on press, and process variables that impact quality and productivity. **Lecture 2, Credits 3 (Fall, Spring)**

MAAT-377

Advanced Retouching and Restoration

This course demystifies the process for digitally enhancing, retouching, and restoring images with industry standard raster software, using best practices for image acquisition and specialized image manipulation techniques. Students should have a solid working knowledge of current industry standard raster software. (Prerequisites: MAAT-107 or equivalent course.) **Lab 3, Credits 3 (Fall)**

MAAT-377

Advanced Retouching and Restoration

This course demystifies the process for digitally enhancing, retouching, and restoring images with industry standard raster software, using best practices for image acquisition and specialized image manipulation techniques. Students should have a solid working knowledge of current industry standard raster software. (Prerequisites: MAAT-107 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

MAAT-399

Media Arts/Technology PT Coop

The Media Arts and Technology Part-time Co-op provides students with the opportunity to work in a position related to their major field of study. Co-ops are typically paid work experiences. This course is for approved co-op work that is part-time (less than 20 hours per week) only. All co-ops should fall within an RIT term (fall, spring, summer) and require permission of instructor for enrollment. (Prerequisites: MAAT-10 or equivalent course.) **CO OP, Credits 0 (Fall, Spring, Summer)**

MAAT-401

Team Project

This course will engage students in a capstone production experience. Students will work in teams and interact with select industry clients to design, budget, and complete a multi-media project. (Prerequisites: MAAT-206 and MAAT-223 or equivalent course.) **Lab 3, Credits 3 (Fall)**

MAAT-401

Team Project

This course will engage students in a capstone production experience. Students will work in teams and interact with select industry clients to design, budget, and complete a multi-media project. (Prerequisites: MAAT-206 and MAAT-223 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

MAAT-402**Graphic Media Business Practices**

Print and graphic media professionals need to be versed in technological capabilities and business practices integral to managing a graphic media operation. Beginning with stakeholders in graphic media entities, including providers, vendors, and customers, learners in this course explore factors contributing to operational efficiencies and sustainability in print and graphic media enterprises. The course emphasizes the performance metrics, strategies, and methods required to achieve ethical business success in the industry, including using analytics to support improved decision making, effective marketing, and efficient operations. Recognizing that writing is a fundamental proficiency that permeates professional business management, students engage in informal and formal writing assignments pertinent to the print and graphic media industry throughout the course. (Prerequisites: MAAT-267 and COMM-142 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MAAT-446**Magazine Publishing**

This class is an introduction to the concepts and methods of magazine design and production workflow, with the practical experience of producing a cross-media magazine for output to a digital device and print. Special attention is given to the use of images in integration with text, grids. The role of experimentation and innovation in the modern magazine is emphasized. (Prerequisites: MAAT-106 or equivalent course.) **Lab 3, Credits 3 (Fall)**

MAAT-446**Magazine Publishing**

This class is an introduction to the concepts and methods of magazine design and production workflow, with the practical experience of producing a cross-media magazine for output to a digital device and print. Special attention is given to the use of images in integration with text, grids. The role of experimentation and innovation in the modern magazine is emphasized. (Prerequisites: MAAT-106 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

MAAT-498**Media Arts and Technology Internship**

The Media Arts & Technology Internship provides students an opportunity to enhance their academic study through professional experience. Students must obtain permission of instructor and complete the Internship Permission to enroll. No more than six (6) credits of internship can be applied toward the degree. (Prerequisites: This class is restricted to students in NMEP-BS with at least 2nd year standing and department permission to enroll.) **Internship, Credits 1 - 3 (Fall, Spring, Summer)**

MAAT-499**Media Arts and Technology Co-op**

The Media Arts and Technology Co-op provides students with the opportunity to work in a position related to their major field of study. Co-ops are typically paid work experiences. All co-ops should fall within an RIT term (fall, spring, summer) and require permission of instructor for enrollment. (Prerequisites: MAAT-10 or equivalent course.) **CO OP, Credits 0 (Fall, Spring, Summer)**

MAAT-503**Operations Management in the Graphic Arts**

An in-depth study of the factors affecting the efficiencies and effectiveness of print media organizations and ultimately their profitability. Includes consideration of both internal factors, such as quality level goals, training, scheduling, plant layout, and financial management, as well as external factors, such as safety enforcement, and environmental and legal issues. **Lecture 3, Credits 3 (Fall)**

MAAT-518**TypoItalia: Typography Research in Northern Italy**

This course is designed to give students intensive educational experiences involving travel abroad to northern Italy. Cities visited in the class may include Venice, Parma, Treviso. The course will explore the history of typography while providing students with a cross-cultural outlook important to understanding the future of typography. Students will examine typography's rich history and modernization through travel abroad and investigate how research of the past can inspire innovation in the future. The course will include visits to typographic museums, lectures, guest speakers, hands-on experiences and activities as students conduct typographic research inspired as they travel. Travel expenses will be incurred for this course. (This course requires permission of the Instructor to enroll.) **Study Abrd, Credits 3 (Summer)**

MAAT-541**Digital Print Processes**

Students who take this course will understand how digital printing technologies work, what they are capable of doing, and how these technologies are used commercially. Students will analyze the factors driving the explosive growth of digital printing, including how the economics of digital and conventional printing compare. The concepts taught in the classroom are reinforced through hands-on labs and field trips to digital printers and equipment suppliers. This course is cross-listed with PPRT-641; students may receive credit for MAAT-541 or PPRT-641, not both. (Not if PPRT-641) **Lab 3, Credits 3 (Fall)**

MAAT-541**Digital Print Processes**

Students who take this course will understand how digital printing technologies work, what they are capable of doing, and how these technologies are used commercially. Students will analyze the factors driving the explosive growth of digital printing, including how the economics of digital and conventional printing compare. The concepts taught in the classroom are reinforced through hands-on labs and field trips to digital printers and equipment suppliers. This course is cross-listed with PPRT-641; students may receive credit for MAAT-541 or PPRT-641, not both. (Not if PPRT-641) **Lecture 2, Credits 3 (Fall)**

MAAT-544**Color Management Systems**

This course covers fundamentals of color measurement, color management system, and color reproduction technology for color matching and color image reproduction. Emphases are placed on CIE colorimetry, device calibration and characterization, and color management systems. (Students cannot take and receive credit for this course if they have taken PPRT-602.) **Lab 2, Credits 3 (Fall)**

MAAT-544**Color Management Systems**

This course covers fundamentals of color measurement, color management system, and color reproduction technology for color matching and color image reproduction. Emphases are placed on CIE colorimetry, device calibration and characterization, and color management systems. (Students cannot take and receive credit for this course if they have taken PPRT-602.) **Lecture 2, Credits 3 (Fall)**

MAAT-550**Topics in Media Arts, Sciences and Technology**

Topics in Media Arts, Sciences and Technology provides a platform for students to explore the most contemporary issues in the rapidly evolving fields of media arts, media sciences and media technologies. The content taught in this course will change frequently and the course may be repeated for credit, however each particular topic may have limits on repeatability. **Lecture 3, Credits 3 (Fall, Spring)**

MAAT-551**Lab Topics in Media Arts, Sciences and Technology**

Lab Topics in Media Arts, Sciences and Technology provides a lab-based platform for students to explore the most contemporary issues in the rapidly evolving fields of media arts, media sciences and media technologies. The content taught in this lab-based course will change frequently and the course may be repeated for credit, however each particular topic may have limits on repeatability. (This course is available to RIT degree-seeking undergraduate students.) **Lab 2, Credits 3 (Fall, Spring)**

MAAT-551**Lab Topics in Media Arts, Sciences and Technology**

Lab Topics in Media Arts, Sciences and Technology provides a lab-based platform for students to explore the most contemporary issues in the rapidly evolving fields of media arts, media sciences and media technologies. The content taught in this lab-based course will change frequently and the course may be repeated for credit, however each particular topic may have limits on repeatability. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 2, Credits 3 (Fall, Spring)**

MAAT-558**Package Printing**

Students who take this course will understand how package-printing technologies work, and how they are used to print bags, labels, cartons, cans, boxes, and bottles. Students will apply a packaging printing workflow to produce labels and folding cartons of their own design. Finally, cost analyses of package printing using various technologies is discussed. This course is cross-listed with PPRT-688; students may receive credit for MAAT-558 or PPRT-688, not both. (Degree-seeking undergraduate students. Students may not take and receive credit for MAAT-558 and PPRT-688. If you have earned credit for MAAT-558 or you are currently enrolled in PPRT-688 you will not be permitted to enroll in MAAT-558.) **Lab 3, Credits 3 (Spring)**

MAAT-558**Package Printing**

Students who take this course will understand how package-printing technologies work, and how they are used to print bags, labels, cartons, cans, boxes, and bottles. Students will apply a packaging printing workflow to produce labels and folding cartons of their own design. Finally, cost analyses of package printing using various technologies is discussed. This course is cross-listed with PPRT-688; students may receive credit for MAAT-558 or PPRT-688, not both. (Degree-seeking undergraduate students. Students may not take and receive credit for MAAT-558 and PPRT-688. If you have earned credit for MAAT-558 or you are currently enrolled in PPRT-688 you will not be permitted to enroll in MAAT-558.) **Lecture 2, Credits 3 (Spring)**

College of Engineering Technology

MAAT-561

Industry Issues and Trends

This course presents a detailed analysis of the critical trends and issues related to the graphic media publishing industry. It provides an in-depth look at key technologies as well as business, environmental and regulatory issues. This course provides culminating experience that contributes to the student's fuller understanding of management of the graphic media publishing industry. This course prepares students for successful careers by providing insights into the nature and scope of the major challenges facing industry managers and leaders and how to manage these challenges. This course is cross-listed with PPRT-642; students may receive credit for MAAT-561 or PPRT-642, not both. (Degree-seeking undergraduate students. Students may not take and receive credit for MAAT-561 and PPRT-642. If you have earned credit for MAAT-561 or you are currently enrolled in PPRT-642 you will not be permitted to enroll in MAAT-561.) **Lecture 3, Credits 3 (Fall)**

MAAT-563

Building Profit into Media Projects

This course familiarizes students with costing, pricing and estimating practices in print media, website development, mobile media, and social media. It highlights areas of similarity in these media but more importantly focuses on those practices and customs that are unique to a specific medium. The course provides the necessary background for developing accurate media proposals that become contractual legal obligations and result in sustained profitability. This course is cross-listed with PPRT-653; students may receive credit for MAAT-563 or PPRT-653, not both. (Students may not take and receive credit for MAAT-563 and PPRT-653. If you have earned credit for MAAT-563 or you are currently enrolled in PPRT-653 you will not be permitted to enroll in MAAT-563.) **Lecture 3, Credits 3 (Spring)**

MAAT-571

Digital Asset Management

This course will focus on the development and application of digital asset management strategies for cross media production workflows. Project work will include the development of asset management strategies and the utilization of both small business and enterprise-level digital asset management (DAM) tools and systems. (This course is available to RIT degree-seeking undergraduate students.) **Lab 2, Credits 3 (Fall, Spring)**

MAAT-571

Digital Asset Management

This course will focus on the development and application of digital asset management strategies for cross media production workflows. Project work will include the development of asset management strategies and the utilization of both small business and enterprise-level digital asset management (DAM) tools and systems. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 2, Credits 3 (Fall, Spring)**

MAAT-599

Independent Study

The Independent Study in media arts and technology provides students with the means for obtaining academic credit for work and/or research on topics related to the media arts and technology curriculum but not covered in the desired breadth or depth. The student works with an instructor to establish the objectives, content, and evaluation protocol for the study. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 6 (Fall, Spring, Summer)**

Robotics and Manufacturing Engineering Technology

RMET-105

Machine Tools Lab

Proficiency with traditional machine shop tools will be demonstrated with an emphasis on safety. Students will demonstrate their abilities to interpret drawings and select the appropriate equipment needed to produce each part. Parts built will be inspected by the student to verify the meeting of part requirements. Students will repair/replace any parts that are found to be out of specifications. Inspection tools will be utilized in the product validation requirement of the course. Topics will be experimentally validated through the creation of mechanical parts that will be assembled into a final product. (This class is restricted to MCET-BS or MECA-BS or RMET-BS or EMET-BS major students.) **Lab 2, Credits 1 (Fall, Spring)**

RMET-120

Manufacturing Processes

This course will focus on the understanding and application of manufacturing processes. Students will be challenged to discover and learn how typical piece parts and assemblies are manufactured. Topics include material properties and the following process families: casting, material removal, deformation, consolidation, powder metallurgy, plastics fabrication, EDM, water jet, chemical, LASERS, plasma, and rapid prototyping. (This class is restricted to MCET-BS or MECA-BS or RMET-BS or EMET-BS or MANUFYSY-MN or ENGTEH-UND students.) **Lecture 3, Credits 3 (Fall)**

RMET-340

Automation Control Systems

This course will provide a thorough understanding of the manufacturing automation principles, practices and system integration. Students will design a fully automated control system from selection of components, specifying the Programmable Logic Controller (PLC), and developing the ladder logic required to operate the system. Students will have the tools to effectively be able to fully design an automated control system as in done in varying industries. (Co-requisite: RMET-341 or equivalent course.) **Lecture 2, Credits 2 (Fall, Spring)**

RMET-341

Automation Control Systems Lab

This course will provide a thorough hands-on experience in using Programmable Logic Controllers (PLCs) for manufacturing automation and system integration. Industry best practices for programming PLCs and the essentials of Human Machine Interface (HMI) for data entry, manipulation, and recording system status will be included. (Co-requisites: RMET-340 or equivalent course.) **Lab 2, Credits 1 (Fall, Spring)**

RMET-571

Advanced Automation Systems and Control

This course deals with the higher level of topics relating to automation control systems engineering. Learning different programming languages, troubleshooting techniques, advanced programming instructions, the use and application of Human Machine Interface (HMI) panels, analog devices uses and applications, advanced system design, networking and an introduction to Industry 4.0 are all covered in this course. (Pre-requisites: MFET-340 or equivalent course. Students cannot take and receive credit for this course if they have taken RMET-671.) **Lecture 3, Credits 3 (Spring)**

RMET-571

Advanced Automation Systems and Control

This course deals with the higher level of topics relating to automation control systems engineering. Learning different programming languages, troubleshooting techniques, advanced programming instructions, the use and application of Human Machine Interface (HMI) panels, analog devices uses and applications, advanced system design, networking and an introduction to Industry 4.0 are all covered in this course. (Pre-requisites: MFET-340 or equivalent course. Students cannot take and receive credit for this course if they have taken RMET-671.) **Recitation 1, Credits 3 (Spring)**

RMET-580

Production Systems Design

Integrated design, problem solving, process development and assembly techniques are essential for robotics and manufacturing engineering technology. RMET 580 Production Systems Design and RMET 590 Production systems development together form the robotics and manufacturing engineering technology senior project. In RMET 580, students design a fully functioning automated workcell. Students also practice project management, project planning, and effective communication. Process improvement permeates the integrated activities. Design, final documentation and demonstration of a fully functional workcell are required. This is the Writing Intensive course for RMET students. (Prerequisites: RMET-340 and RMET-585 and RMET-460 or equivalent courses. Co-requisites: RMET-590 or MFET-590 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

RMET-585

Robots and Automation

This course focuses on the technology and application of robots and automation in the modern manufacturing environment. It will provide a thorough understanding of robotic hardware and software. The hardware aspects include robot configurations, drive mechanisms, power systems (hydraulic, pneumatic, and servo actuators), end-effectors and end-of-arm-tooling, sensors, control systems, machine vision, programming, safety, and integration. The software aspect deals with the various methods of textual and lead through programming commonly found on commercial robotic systems, as well as simulation systems offered by robot manufacturers. Digital Interfacing of robots with other automation components such as programmable logic controllers, computer-controlled machines, conveyors, is introduced. Robotic cell design and the socio-economic impact of robotics are also discussed. This course also has a strong experiential component that emphasizes hands-on training. This course may be cross-listed with RMET-685. Students may not take and receive credit for this course if they have already taken RMET-685. College-level programming experience in at least one computer language strongly recommended. (Prerequisites: MCET-220 or CVET-210 or MECE-103 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

RMET-585

Robots and Automation

This course focuses on the technology and application of robots and automation in the modern manufacturing environment. It will provide a thorough understanding of robotic hardware and software. The hardware aspects include robot configurations, drive mechanisms, power systems (hydraulic, pneumatic, and servo actuators), end-effectors and end-of-arm-tooling, sensors, control systems, machine vision, programming, safety, and integration. The software aspect deals with the various methods of textual and lead through programming commonly found on commercial robotic systems, as well as simulation systems offered by robot manufacturers. Digital Interfacing of robots with other automation components such as programmable logic controllers, computer-controlled machines, conveyors, is introduced. Robotic cell design and the socio-economic impact of robotics are also discussed. This course also has a strong experiential component that emphasizes hands-on training. This course may be cross-listed with RMET-685. Students may not take and receive credit for this course if they have already taken RMET-685. College-level programming experience in at least one computer language strongly recommended. (Prerequisites: MCET-220 or CVET-210 or MECE-103 or equivalent course.) **Recitation 1, Credits 3 (Fall, Spring)**

RMET-587**Robotics: Sensors and Vision**

Robots in many applications require sensors and/or vision systems to allow the robot to fully understand its environment and tasks. Students learn how to design and integrate robot sensor and vision systems to enable the dynamic use of the robot's capabilities. Robot sensors, 2D and 3D vision systems along with lighting will be used to allow the student to conceptualize, design, and program robotic techniques related to path correction, dynamic positioning, 2D targeting, and 3D picking using robots. Projects will use both robots and simulation software. Students may receive credit for only this course or RMET-687, not both. (Prerequisites: MFET-585 or MFET-685. Also, students cannot take and receive credit for this course if they have taken RMET-687.) **Lecture 3, Credits 3 (Spring)**

RMET-589**Special Topics**

Special topics is an experimental upper-division course intended as a means for offering innovative topics not currently reflected in the Robotics and Manufacturing Engineering Technology curriculum. (Prerequisites: 4th year student standing in RMET, MFET, MCET, MECA, EMET-BS or EMET-BSMS and completion of at least 1 co-op block.) **Lecture, Credits 1 - 3 (Fa/sp/su)**

RMET-590**Production Systems Development Lab**

Integrated design, problem solving, process development and assembly techniques are essential for robotics and manufacturing engineering technology. RMET 580 Production Systems Design and RMET 590 Production systems development together form the robotics and manufacturing engineering technology senior project. In RMET 590, students construct a fully functioning automated workcell. Students also practice project management, project planning, and effective communication. Process improvement permeates the integrated activities. Design, final documentation and demonstration of a fully functional workcell are required. (Co-requisites: RMET-580 or equivalent course.) **Lab 3, Credits 2 (Spring)**

Packaging Science

PACK-095**Career Seminar**

This course is an introduction to the cooperative educational placement process at RIT, the programs in the department and RIT resources. Topics include engineering technology vs. engineering, review of resources available at RIT, the co-operative education placement process, and the ethical expectations of employers for co-op students and RIT during a job search. **Seminar 1, Credits 0 (Fall, Spring)**

PACK-101**Introduction to Packaging**

An in-depth overview of packaging. The course will include historical perspectives of packaging. Students will explore the functions of packaging and the materials, processes, and technology employed to protect goods during handling, shipment, and storage. A brief review of container types, package design and development, and research and testing are presented, along with information about economic importance, social implications, and packaging as a profession. Students will research historical, current, and future packages to gain better insight into the world of packaging. **Lecture 1, Credits 1 (Fall, Spring)**

PACK-151**Packaging Design I**

The course develops knowledge of engineering design graphics and skills of package structure design. Topics covered are basics of engineering design graphics, technical sketch, project plan, design matrix and computer aided design (CAD). Emphasis is given to use SolidWorks - CAD software to design typical packaging structures. The 10-week design project focuses on developing a packaging structure from an idea to a 3D virtual prototype. **Lec/Lab 3, Credits 3 (Fall)**

PACK-152**Packaging Design II**

The course develops knowledge and skills in applying two computer software packages for packaging design: Artios CAD and Adobe Illustrator. Topics covered are builder and rebuilder, solid modeling and drawing, animation, coloring, and painting. Emphasis is given to create a typical paperboard based carton with a proper structure and color usage. (Co-requisites: PACK-101 or equivalent course.) **Lec/Lab 4, Credits 3 (Spring)**

PACK-211**Packaging Metals and Plastics**

The study of packaging materials from extraction through conversion and production, physical and chemical properties and uses. Emphasis is on plastics and metals used in packaging and other component materials. Recognized standard testing procedures are presented and students gain practical experience in the operation of various testing instruments, interpretation of results, and evaluation of properties and performance characteristics. (Co-requisites: PACK-101 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

PACK-211**Packaging Metals and Plastics**

The study of packaging materials from extraction through conversion and production, physical and chemical properties and uses. Emphasis is on plastics and metals used in packaging and other component materials. Recognized standard testing procedures are presented and students gain practical experience in the operation of various testing instruments, interpretation of results, and evaluation of properties and performance characteristics. (Co-requisites: PACK-101 or equivalent course.) **Recitation 1, Credits 3 (Fall, Spring)**

PACK-212**Packaging Paper and Glass**

The manufacture, physical and chemical properties, and uses of common packaging materials. Emphasis is on paper, paperboard, wood, glass, and pressurized packaging systems used in packaging applications. Standard testing procedures will be presented as well as instruction on testing equipment operation, data interpretation, evaluation of properties, and performance. (Co-requisites: PACK-101 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

PACK-212**Packaging Paper and Glass**

The manufacture, physical and chemical properties, and uses of common packaging materials. Emphasis is on paper, paperboard, wood, glass, and pressurized packaging systems used in packaging applications. Standard testing procedures will be presented as well as instruction on testing equipment operation, data interpretation, evaluation of properties, and performance. (Co-requisites: PACK-101 or equivalent course.) **Recitation 1, Credits 3 (Fall, Spring)**

PACK-301**Packaging Materials**

This first course in the packaging science minor will provide students with the opportunity to learn the basic properties and applications for the common packaging materials. Students will be instructed in fundamental evaluation procedures and in the determination of material specifications. (Students in PACK-BS and PACK-2M are unable to enroll in this class.) **Lecture 3, Credits 3 (Fall, Spring)**

PACK-302**Packaging Containers**

This first course in the packaging science minor will provide students with the opportunity to learn the basic properties and applications for the common packaging container formats. Students will be instructed in fundamental evaluation procedures and in the determination of container design specifications. (Students in PACK-BS and PACK-2M are unable to enroll in this class.) **Lecture 3, Credits 3 (Fall, Spring)**

PACK-311**Containers I**

A detailed study of primary packages that includes the history, manufacturing processes, characteristics, and applications for containers in direct contact with the product. Structural design, chemical compatibility, and suitability of container for intended use are analyzed for basic container types. Students practice structural design and testing of prototype containers. Primary emphasis is on flexible paper, foil, plastic, and laminated materials and on selected processing techniques. Topics to include folding cartons, heat seal technology and test methodologies, permeability theory, modeling, and empirical testing. (Prerequisites: PACK-151 and PACK-211 and PACK-212 or equivalent courses. Co-requisites: PACK-152 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

PACK-311**Containers I**

A detailed study of primary packages that includes the history, manufacturing processes, characteristics, and applications for containers in direct contact with the product. Structural design, chemical compatibility, and suitability of container for intended use are analyzed for basic container types. Students practice structural design and testing of prototype containers. Primary emphasis is on flexible paper, foil, plastic, and laminated materials and on selected processing techniques. Topics to include folding cartons, heat seal technology and test methodologies, permeability theory, modeling, and empirical testing. (Prerequisites: PACK-151 and PACK-211 and PACK-212 or equivalent courses. Co-requisites: PACK-152 or equivalent course.) **Recitation 1, Credits 3 (Fall, Spring)**

PACK-312**Containers II**

This course is a detailed study of primary packages. History, manufacturing processes characteristics, and applications for containers in direct contact with the product. Structural design, chemical compatibility, and suitability of container for intended use are analyzed for basic container types. Students practice structural design and testing of prototype containers. Primary emphasis is on rigid paperboard, glass, plastic, and metal containers. (Prerequisites: PACK-151 and PACK-211 and PACK-212 or equivalent courses. Co-requisites: PACK-152 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

PACK-312**Containers II**

This course is a detailed study of primary packages. History, manufacturing processes characteristics, and applications for containers in direct contact with the product. Structural design, chemical compatibility, and suitability of container for intended use are analyzed for basic container types. Students practice structural design and testing of prototype containers. Primary emphasis is on rigid paperboard, glass, plastic, and metal containers. (Prerequisites: PACK-151 and PACK-211 and PACK-212 or equivalent courses. Co-requisites: PACK-152 or equivalent course.) **Recitation 1, Credits 3 (Fall, Spring)**

PACK-420**Technical Communications**

An introduction to the principles of effective written technical communication for professional environments. Topics include memos, business letters, summary activity reports, technical proposals, and research papers. (Pre-requisites: This course is restricted to PACK-BS or NMPE-BS students. Co-requisites: First Year Writing (FYW).) **Lecture 3, Credits 3 (Fall, Spring)**

PACK-421 Packaging for Distribution
An exploration of different shipping, storage, and use environments common to various products and packages. Structural design of shipping containers for product physical protection and methods for testing and predicting package performance are studied. Package converting processes will be studied to reinforce the economics of efficient and sustainable package design. (Prerequisites: PACK-311 and PACK-312 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

PACK-421 Packaging for Distribution
An exploration of different shipping, storage, and use environments common to various products and packages. Structural design of shipping containers for product physical protection and methods for testing and predicting package performance are studied. Package converting processes will be studied to reinforce the economics of efficient and sustainable package design. (Prerequisites: PACK-311 and PACK-312 or equivalent courses.) **Recitation 1, Credits 3 (Fall, Spring)**

PACK-422 Dynamics and Protective Packaging
The course defines the factors involved in assessing the potential damage to packaged items resulting from impact and vibration forces in the handling, transport and storage environments. Students will be instructed in the use of basic shock and vibration test equipment, apply standard test protocols and develop specific testing protocols from measured field data. Based on data generated from testing activities, students will develop cushion designs to protect sensitive product components. (Prerequisites: PACK-421 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

PACK-422 Dynamics and Protective Packaging
The course defines the factors involved in assessing the potential damage to packaged items resulting from impact and vibration forces in the handling, transport and storage environments. Students will be instructed in the use of basic shock and vibration test equipment, apply standard test protocols and develop specific testing protocols from measured field data. Based on data generated from testing activities, students will develop cushion designs to protect sensitive product components. (Prerequisites: PACK-421 or equivalent course.) **Recitation 1, Credits 3 (Fall, Spring)**

PACK-430 Packaging Regulations
This course begins with an overview of government laws and regulations applicable to the packaging industry. Students will then gain the hierarchical impact that regulations have on the global supply chain, quality systems, patent innovation, and workplace safety. (Prerequisites: (PACK-301 and PACK-302) or (PACK-311 and PACK-312) or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

PACK-451 Packaging Development – Advanced Applications
Students will learn to plan and develop virtual and real packaging prototypes to reflect the requirements of end users, assess the sustainability of the designs, and validate designs in the supply chain. (Prerequisites: PACK-421 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

PACK-451 Packaging Development – Advanced Applications
Students will learn to plan and develop virtual and real packaging prototypes to reflect the requirements of end users, assess the sustainability of the designs, and validate designs in the supply chain. (Prerequisites: PACK-421 or equivalent course.) **Recitation 1, Credits 3 (Fall)**

PACK-470 Food Packaging
Study of food products, common methods of processing and preservation, impact on quality and nutritional value of the product, and the relationships with common packaging methods and distribution practices. Students required to deliver a project to support the objectives of this course. (Prerequisites: PACK-311 and PACK-312 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

PACK-470 Food Packaging
Study of food products, common methods of processing and preservation, impact on quality and nutritional value of the product, and the relationships with common packaging methods and distribution practices. Students required to deliver a project to support the objectives of this course. (Prerequisites: PACK-311 and PACK-312 or equivalent courses.) **Recitation 1, Credits 3 (Fall)**

PACK-471 Packaging Supply Chain
Market structures are analyzed in order to develop an understanding of how packaging relates to the general economy. Students will learn how market traded derivatives are utilized to protect against price volatility of packaging raw materials, utilization of Purchase Price Cost Analysis to predict packaging pricing and price movements. Packaging contract analysis and packaging pricing formula based pricing will be studied. Students are instructed in the use of basic pricing reference materials for research purposes. (Prerequisites: PACK-421 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

PACK-481 Packaging for Marketing and End Use
The interrelationship between packaging and marketing, detailing how the retail consumer package can be used as a marketing tool. Concentrates on a systematic approach to developing an optimum package for a given product to meet the demands of the retail market and end user. Students gain practice in the development of a complete package system. (Prerequisites: PACK-421 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

PACK-481 Packaging for Marketing and End Use
The interrelationship between packaging and marketing, detailing how the retail consumer package can be used as a marketing tool. Concentrates on a systematic approach to developing an optimum package for a given product to meet the demands of the retail market and end user. Students gain practice in the development of a complete package system. (Prerequisites: PACK-421 or equivalent course.) **Recitation 1, Credits 3 (Fall, Spring)**

PACK-498 Packaging Independent Undergraduate Research
Independent undergraduate research experience involves students in an original research project. Using one or a variety of methods, students will collect data and contribute to problem solving in the packaging field. As a first research experience, emphasis is on the process of scientific research, including problem definition, formulating a research plan, data collection/analysis and interpretation based on existing research. (Prerequisites: PACK-312 & PACK-420 or equivalent courses.) **Lecture 1, Credits 1 (Fall, Spring, Summer)**

PACK-499 Cooperative Work Experience
Off-campus work in an approved salaried position with cooperating company. Department permission is required. (Third year status) (A minimum of 3rd year standing is required to enroll.) **CO OP, Credits 0 (Fall, Spring)**

PACK-530 Packaging Sustainability and the Environment
Consideration of packaging in a social context. Factors that enhance secondary use, recycling, recovery of resources, and proper disposal are discussed. Package design in relation to solid waste disposal and materials and energy shortages are considered. Other topics of interest are discussed. Primarily a discussion class for senior students. Open to undergraduate non-majors. (Prerequisites: (PACK-301 and PACK-302) or (PACK-311 and PACK-312) or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

PACK-531 Packaging Process Control
An advanced course designed to give packaging students instruction process and quality control techniques for packaging applications. The course will develop TQM skills for the evaluation of packaging components and packaging manufacturing processes to design sustainable packaging. Topics include the concepts of zero defects, computer applications for control charts, and acceptance sampling. (Co-requisite: PACK-421 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

PACK-535 Characterization and Evaluation of Polymer Packaging
The course develops knowledge of integrated analytical techniques in characterization and evaluation of polymer packaging. Topics covered are basics of polymer packaging production, characterization of thermal properties, evaluation of barrier and mechanical properties for polymer packaging, as well as identification and development of multi layer package structures. (Prerequisites: CHMG-122 and CHMG-123 and CHMG-201 and (PACK-211 or (PACK-301 and PACK-302) or equivalent courses.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

PACK-546 Pharmaceutical and Medical Packaging
Students will define the types of packages used in medical and pharmaceutical product applications. Aseptic packaging operations will be explained and demonstrated. Students will utilize ISO 11607, parts 1 and 2 and the AAMI TIR 22 for medical product packaging. A compliance document and finished prototype for ISO 11607 will be required. (Prerequisites: (PACK-301 and PACK-302) or (PACK-311 and PACK-312) or equivalent courses. Co-requisites: PACK-547 or equivalent course.) **Lecture 2, Credits 2 (Spring)**

PACK-547 Pharmaceutical and Medical Packaging Lab
Students will define the types of packages used in medical and pharmaceutical product applications. Aseptic packaging operations will be explained and demonstrated. Students will utilize ISO 11607, parts 1 and 2 and the AAMI TIR 22 for medical product packaging. A compliance document and finished prototype for ISO 11607 will be required. (Co-requisites: PACK-546 or equivalent course.) **Lab 2, Credits 1 (Spring)**

PACK-550 Packaging Machinery
A study of package forming and filling, closing, product/package identification, inspection, and other machinery commonly used in packaging, plus consideration of handling and storage/retrieval systems. Students become aware of project management techniques, setting timelines, critical path, and resource evaluation. Quality tools and issues along with quality control processes are integrated into line and machinery designs. Students gain practice in setting up complete production lines for packaging various products. (Prerequisites: (PACK-301 and PACK-302) or (PACK-311 and PACK-312) or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

PACK-555**Import/Export Packaging**

Study of the particular forms and requirements for packaging for the import/export environment. Preservation techniques, international logistics, bulk containers, packing requirements, handling, transport and storage, and related documentation. (Prerequisites: (PACK-301 and PACK-302) or (PACK-311 and PACK-312) or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

PACK-560**Converting and Flexible Packaging**

The course develops knowledge and techniques in converting and flexible packaging. Topics covered are converting materials, quality control practice in converting, evaluation of packaging film and converting applications in flexible packaging. This course is co-listed with PACK-660; students may receive credit for PACK-560 or PACK-660, not both. (Prerequisites: CHMG-131 or equivalent course. Students may not take and receive credit for PACK-560 and PACK-660. If you have earned credit for PACK-660 or you are currently enrolled in PACK-660 you will not be permitted to enroll in PACK-560.) **Lec/Lab 4, Credits 3 (Spring)**

PACK-599**PS Independent Study**

Independent study, in consultation with the instructor, on any packaging-related topic. Approvals are necessary from the department chair. (Undergraduate Research and Independent Study (PACK-598 and 599) combined total credit allowed is limited to a maximum of 3 credits. Independent Study total credit limit maximum of eight credits. **Ind Study, Credits 1 - 3 (Fall, Spring, Summer)**

Reserve Officer's Training Corps-Air Force

AERO-101**Heritage and Values I**

This course and its follow-on provide the student with an introductory survey of the United States Air Force (USAF) and the Air Force Reserve Officer Training Corps (AFROTC). In the first semester, the course begins with an introduction to ROTC as well as the customs and courtesies and dress and appearance standards expected of Air Force officers. It continues with a discussion on team building, military communication skills and interpersonal communications. The organization of the Air Force and how the Air Force contributes to the accomplishment of our national security objectives is also covered. The course concludes with an overview of Air Force career opportunities and benefits. Leadership Laboratory is mandatory for AFROTC contract/pursuing cadets and complements this course by providing cadets with followership experiences. **Lecture 1, Credits 1 (Fall)**

AERO-102**Heritage and Values II**

This course covers an introduction to Air Force core values and offers the student an opportunity to learn about leadership, its principles, and its effective traits. The course demonstrates knowledge of Air Force heritage and legacy. Students are also introduced to basic oral and written communication skills. The course continues by exploring war, its basic principles, and motivation. The course concludes with an understanding of the Air Force oath of office and how human relations can affect them as an Air Force Officers. Leadership Laboratory is mandatory for AFROTC contract/pursuing cadets and complements this course by providing cadets with followership experiences. **Lecture 1, Credits 1 (Spring)**

AERO-201**Team and Leadership Fundamentals I**

This course examines the development of military air and space power from the first balloons to the on-going conflicts in Afghanistan and other parts of the world, introduces fundamental principles associated with war in the third dimension, and employs historical examples to explain the evolution of U.S. Air Force air and space power. The full course covers two academic terms. This term focuses on examples from the earliest days of flight through the Cuban Missile Crisis. This course also seeks to develop students' communication skills through class participation, short writing and briefing assignments. AFROTC Leadership Laboratory (WMIL-006) and AFROTC Physical Training (WMIL-001) complements this course by providing applied followership and leadership experience and is mandatory for all AFROTC cadets. Other interested undergraduate students (non-cadets) will be considered for registration but must have the detachment commander's approval for this course and any required co-requisites (if desired). **Lecture 1, Credits 1 (Fall)**

AERO-202**Team and Leadership Fundamentals II**

This course examines the development of military air and space power from the first balloons to the on-going conflicts in Afghanistan and other parts of the world, introduces fundamental principles associated with war in the third dimension, and employs historical examples to explain the evolution of U.S. Air Force air and space power. The full course covers two academic terms. This term focuses on examples from the Vietnam War to the "Global War on Terror." This course also seeks to develop students' communication skills through class participation, short writing and briefing assignments AFROTC Leadership Laboratory (WMIL-006) and AFROTC Physical Training (WMIL-001) complements this course by providing applied followership and leadership experience and is mandatory for all AFROTC cadets. Other interested undergraduate students (non-cadets) will be considered for registration but must have the detachment commander's approval for this course and any required co-requisites (if desired). **Lecture 1, Credits 1 (Spring)**

AERO-401 National Security/Leadership Responsibilities and Commissioning Preparation I

This course examines national security policy and process, regional issues, advanced leadership, air and space power functions and competencies. It is the first in a two-course sequence during which you will study roles of the military in society; military justice and law; current issues affecting the military profession; and regional cultural, politics and history. You will also study air and space power functions and competencies and the responsibilities of officership. Finally, this course also seeks to develop students' communication skills through class participation, short writing and briefing assignments. AFROTC Leadership Laboratory (WMIL-006) and AFROTC Physical Training (WMIL-001) complements this course by providing applied followership and leadership experience and is mandatory for all AFROTC cadets. Other interested undergraduate students (non-cadets) will be considered for registration but must have the detachment commander's approval for this course and any required co-requisites (if desired). **Lecture 3, Credits 3 (Fall)**

AERO-402 National Security/Leadership Responsibilities and Commissioning Preparation II

This course examines national security policy and process, regional issues, advanced leadership, air and space power functions and competencies. It is the second in a two-course sequence during which you will study roles of the military in society; military justice and law; current issues affecting the military profession; and regional cultural, politics and history. You will also study air and space power functions and competencies and the responsibilities of officership. Finally, this course also seeks to develop students' communication skills through class participation, short writing and briefing assignments. AFROTC Leadership Laboratory (WMIL-006) and AFROTC Physical Training (WMIL-001) complements this course by providing applied followership and leadership experience and is mandatory for all AFROTC cadets. Other interested undergraduate students (non-cadets) will be considered for registration but must have the detachment commander's approval for this course and any required co-requisites (if desired). **Lecture 3, Credits 3 (Spring)**

Reserve Officer's Training Corps-Army

ARMY-101**Introduction to Leadership**

This course introduces you to the personal challenges and competencies that are critical for effective leadership and the structure of the ROTC Basic courses which consist of ARMY-101, 102, 201, 202, Fall and Spring Leadership Labs, and LTC. You will learn how the personal development of life skills such as cultural understanding, goal setting, time management, mental/physical resiliency, and stress management relate to leadership, officership, and the Army profession. The focus is on developing basic knowledge and comprehension of Army leadership dimensions, attributes, and core leader competencies while gaining an understanding of the ROTC program, its purpose in the Army, and its advantages for the student. Enrollment must be approved by the professor of military science. Students enrolled in Army ROTC must register for Army Conditioning Drills (Physical Training) and Army Leadership Lab when registering for the ARMY-101 class. **Lecture 2, Credits 2 (Fall)**

ARMY-102**Introduction to Tactical Leadership**

This course covers the overview of leadership fundamentals such as setting direction, problem-solving, listening, presenting briefs, providing feedback, and using effective writing skills. You will explore dimensions of leadership attributes and core leader competencies in the context of practical, hands-on, and interactive exercises. Enrollment must be approved by professor of military science. Students enrolled in Army ROTC must register for Army Conditioning Drills (Physical Training) and Army Leadership Lab when you take the ARMY-102 class. **Lecture 2, Credits 2 (Spring)**

ARMY-201**Innovative Team Leadership**

This course explores the dimensions of creative and innovative tactical leadership strategies and styles by examining team dynamics and two historical leadership theories that form the basis of the Army leadership framework. Aspects of personal motivation and team building are practiced through planning, executing, and assessing team exercises. The focus continues to build on developing knowledge of the leadership attributes and core leader competencies through the understanding of Army rank, structure, and duties as well as broadening knowledge of land navigation and squad tactics. Case studies will provide a tangible context for learning the Soldier's Creed and Warrior Ethos. Enrollment must be approved by the professor of military science. Students enrolled in Army ROTC must register for Army Conditioning Drills (PT) and Army Leadership Lab when they enroll in ARMY-201. **Lecture 2, Credits 2 (Fall)**

ARMY-202

Foundations of Tactical Leadership

This course examines the challenges of leading teams in the complex operational environment. The course highlights dimensions of terrain analysis, patrolling, and operation orders. Further study of the theoretical basis of the Army Leadership Requirements Model explores the dynamics of adaptive leadership in the context of military operations. ARMY-202 prepares Cadets for ROTC-301. Cadets develop greater self-awareness as they assess their own leadership styles and practice communication and team building skills. Case studies give insight into the importance and practice of teamwork and tactics in real-world scenarios. Enrollment must be approved by the professor of military science. Students enrolled in Army ROTC must register for Army Conditioning Drills (PT) and Army Leadership Lab when they enroll in ARMY-202. **Lecture 2, Credits 2 (Spring)**

ARMY-301

Adaptive Team Leadership

This is an academically challenging course where you will study, practice, and apply the fundamentals of Army leadership, officership, Army values and ethics, personal development, and small unit tactics at the team and squad level. At the conclusion of this course, you will be capable of planning, coordinating, navigating, motivating, and leading a team or squad in the execution of a tactical mission during a classroom PE, a Leadership Lab, or during a Situational Training Exercise (STX) in a field environment. Successful completion of this course will help prepare you for success at the ROTC Leader Development and Assessment Course (LDAC) which you will attend next summer at Fort Lewis, WA. This course includes reading assignments, homework assignments, small group assignments, briefings, case studies, practical exercises, a mid-term exam, and a final exam. You will receive systematic and specific feedback on your leader attributes values and core leader competencies from your instructor and other ROTC cadre and MSL IV Cadets who will evaluate you using the ROTC Leader Development Program (LDP) model. Enrollment must be approved by the professor of military science. Students enrolled in Army ROTC must also register for Army Conditioning Drills (Physical Fitness Training) and Army Leadership Lab **Lecture 2, Credits 2 (Fall)**

ARMY-302

Applied Team Leadership

This is an academically challenging course where you will study, practice, and apply the fundamentals of Army leadership, officership, Army values and ethics, personal development, and small unit tactics at the team and squad level. At the conclusion of this course, you will be capable of planning, coordinating, navigating, motivating, and leading a team or squad in the execution of a tactical mission during a classroom PE, a Leadership Lab, or during a Situational Training Exercise (STX) in a field environment. Successful completion of this course will help prepare you for success at the ROTC Leader Development and Assessment Course (LDAC) which you will attend next summer at Fort Lewis, WA. This course includes reading assignments, homework assignments, small group assignments, briefings, case studies, practical exercises, a mid-term exam, and a final exam. You will receive systematic and specific feedback on your leader attributes values and core leader competencies from your instructor and other ROTC cadre and MSL IV Cadets who will evaluate you using the ROTC Leader Development Program (LDP) model. Enrollment must be approved by the professor of military science. Students enrolled in Army ROTC must also register for Army Conditioning Drills (PT) and Army Leadership Lab. **Lecture 2, Credits 2 (Spring)**

ARMY-401

Adaptive Team Leadership II

This is an academically challenging course where you will study, practice, and apply the fundamentals of Army leadership. You will learn how to train, mentor, and evaluate underclass cadets while learning the duties and responsibilities of an Army staff officer and applying the Military Decision Making Process (MDMP), the Army Writing Style, and the Army's Training Management, and Mission Essential Task List (METL) development processes during weekly training meetings to plan, execute, and assess battalion training events. Enrollment must be approved by the professor of military science. Students enrolled in Army ROTC must also register for Army Conditioning Drills (PT) and Leadership Lab. **Lecture 2, Credits 2 (Fall)**

ARMY-402

Leadership in a Complex World

The course places significant emphasis on preparing cadets for their first unit of assignment. It uses case studies, scenarios, and "What Now, Lieutenant?" exercises to prepare cadets to face the complex ethical and practical demands of leading as commissioned officers in the U.S. Army. It develops cadet proficiency in planning, executing, and assessing complex operations, functioning as a member of a staff, and providing performance feedback to subordinates. Cadets assess risk, make ethical decisions, and lead fellow ROTC cadets. Enrollment must be approved by the professor of military science. Students enrolled in Army ROTC must also register for Army Conditioning Drills (PT) and Leadership Lab. **Lecture 2, Credits 2 (Spring)**

ARMY-501

ARMY ROTC Independent Study

A supervised investigation within an ARMY ROTC area of student interest. Consent of the instructor and departmental approval are required. **Ind Study, Credits 1 - 3 (Fall, Spring)**

College of Health Sciences and Technology

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Course numbering: RIT courses are generally referred to by their alphanumeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100-299), upper division (300-599), or graduate level (600 and above).

Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.

Biomedical Sciences

MEDG-101

Human Biology I

This course is one of a two-course set of courses that explores the biology of the human body. This course focuses on: cells, their structure, and organization; the human reproductive cycle; principle of genetic inheritance; transmission of disease and the body's defense against disease. Recommended to concurrently take: MEDG-103 Human Biology Laboratory I *Note: Taken alone, this course fulfills the Scientific Principles Perspective. When taken with MEDG-103 the two courses together fulfill the Natural Science Inquiry Perspective **Lecture 3, Credits 3 (Fall)**

MEDG-102

Human Biology II

This course is one of a two-course set of courses that explores the biology of the human body. This course focuses on the examination of the body's structure (anatomy), its function (physiology), the principle of homeostasis that governs the integrated control of all body organ systems, and various disease states (pathology) that affect its health. Recommended to concurrently take: MEDG-104 Human Biology Laboratory II *Note: Taken alone, this course fulfills the Scientific Principles Perspective. When taken with MEDG-104 the two courses together fulfill the Natural Science Inquiry Perspective **Lecture 3, Credits 3 (Spring)**

MEDG-103

Human Biology Laboratory I

This laboratory complements the lecture material of Human Biology I. Experiments are designed to illustrate the dynamic characteristics of a cell during processes of inheritance, development and disease. Recommended to concurrently take: MEDG-101 Human Biology I *Note: When taken with MEDG-101 the two courses together fulfill the Natural Science Inquiry Perspective **Lab 2, Credits 1 (Fall)**

MEDG-104

Human Biology Laboratory II

This laboratory course complements the lecture material presented in Human Biology II. Lab experiments are designed to illustrate the dynamic anatomy and physiology of the human body organ systems. Recommended to concurrently take: MEDG-102 Human Biology II *Note: When taken with MEDG-102 the two courses together fulfill the Natural Science Inquiry Perspective. **Lab 2, Credits 1 (Spring)**

MEDG-105

Health Awareness

This course explores the effects of wellness and disease prevention on the human lifecycle, lifestyles and overall health. Basic structure and function of selected human body systems are discussed and related to factors such as diet and nutrition, alcohol, drugs, smoking, stress and the environment in discussion of health promotion and disease prevention. Lecture and class discussion and student participation are used to explore health related issues. (This course is available to RIT degree-seeking undergraduate students.) **Lecture 3, Credits 3 (Spring)**

MEDG-106

Microbiology of Health and Disease

An introductory course in microbiology including its history, significant contributions to medicine and history, as well as a survey of microbiological organisms as they relate to disease, industry and biotechnology. (any course in Biology) **Lecture 3, Credits 3 (Spring)**

MEDG-107

Human Diseases

A general survey of human diseases from a systematic approach with emphasis on disease symptoms, etiology, diagnosis and prognosis. Also included are the topics of immunology, oncology, endocrinology, and pathophysiology. Upon completion of this course students will have a basic knowledge of many diseases that afflict mankind. **Lab 1, Credits 3 (Spring)**

MEDG-107

Human Diseases

A general survey of human diseases from a systematic approach with emphasis on disease symptoms, etiology, diagnosis and prognosis. Also included are the topics of immunology, oncology, endocrinology, and pathophysiology. Upon completion of this course students will have a basic knowledge of many diseases that afflict mankind. **Lecture 2, Credits 3 (Spring)**

MEDS-101

Introduction to Biomedical, Biobehavioral, and Clinical Research

This course is designed for students who are interested in learning about the many career opportunities that exist in the field of biomedical sciences. This course will engage the students through a combination of self-reflection by the student and continual discussion of presented material that aims to provide clear insight into the many disciplines that are foundational to the biomedical sciences. **Lecture 3, Credits 3 (Spring)**

MEDS-105

Issues in Health Sciences and Technology

This course will provide first-year students with an enhanced understanding of critical issues in global health, science and technology. It will explore cultural awareness and perspectives as well as the consequences of individual and group decisions on the health of communities. **Lecture 3, Credits 3 (Fall)**

MEDS-201

Language of Medicine

Language is a systematic means or method of communicating ideas, events, or feelings. It is a combination of words or symbols used to encode and decode information. Medicine has a language to communicate information regarding the human body, its functions, diseases, tests, and procedures. This course explores the language of medicine, the rules of "language," language mechanics that apply how to create words, define terms, and identify abbreviations. In addition to learning the fundamentals, the student will gain experience in writing, using the language of medicine, as well as interpreting that language into everyday English. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

MEDS-240

History of Medicine

This course explores various discoveries in the history of medicine and the individuals credited with the discoveries. The course begins in ancient Greece and ends with modern times. Individuals such as Hippocrates, Vesalius, Harvey, Jenner, Leeuwenhoek and Roentgen will be discussed. (Prerequisites: (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (MEDG-101 and MEDG-102 and MEDG-103 and MEDG-104) or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

MEDS-242

Cell Structure and Function

This course will cover the foundations of cellular biology and will focus on the integration of cell structure and function as a platform for advanced work in courses such as molecular biology, endocrinology, pharmacology, histology, anatomy & physiology, neuroscience, microbiology, pathology and related areas of study. (Prerequisite: BIOL-101 or BIOL-121 or BIOL-123 or equivalent course and 1st or 2nd year student standing with a major in CHST.) **Lecture 3, Credits 3 (Spring)**

MEDS-245

Medical Genetics

This course will serve as an introduction to the field of medical genetics. Throughout the course we will survey several human variations and diseases of medical importance. Clinical case reports will be incorporated to illustrate the underlying genetic principles. (Prerequisites: (BIOL-123 and BIOL-125 and BIOL-124 and BIOL-126) or (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

MEDS-250

Human Anatomy and Physiology I

This course is an integrated approach to the structure and function of the nervous, endocrine, integumentary, muscular and skeletal systems. Laboratory exercises include histological examination, actual and simulated anatomical dissections, and physiology experiments with human subjects. (Pre-requisite: (BIOL-123 and BIOL-124 and BIOL-125 and BIOL-126) or (BIOL-123 and BIOL-124) or (BIOL-101 and BIOL-102) or (BIOL-121 and BIOL-122) or MEDG-102 or equivalent course or NUTR-BS students.) **Lab 3, Credits 4 (Fall)**

MEDS-250

Human Anatomy and Physiology I

This course is an integrated approach to the structure and function of the nervous, endocrine, integumentary, muscular and skeletal systems. Laboratory exercises include histological examination, actual and simulated anatomical dissections, and physiology experiments with human subjects. (Pre-requisite: (BIOL-123 and BIOL-124 and BIOL-125 and BIOL-126) or (BIOL-123 and BIOL-124) or (BIOL-101 and BIOL-102) or (BIOL-121 and BIOL-122) or MEDG-102 or equivalent course or NUTR-BS students.) **Lecture 3, Credits 4 (Fall)**

MEDS-251 **Human Anatomy and Physiology II**
This course is an integrated approach to the structure and function of the gastrointestinal, cardiovascular, immunological, respiratory, excretory, and reproductive systems with an emphasis on the maintenance of homeostasis. Laboratory exercises include histological examinations, anatomical dissections and physiological experiments using human subjects. (Pre-requisite: (BIOL-123 and BIOL-124 and BIOL-125 and BIOL-126) or (BIOL-123 and BIOL-124) or (BIOL-101 and BIOL-102) or (BIOL-121 and BIOL-122) or MEDG-102 or equivalent course or NUTR-BS students.) **Lab 3, Credits 4 (Spring)**

MEDS-251 **Human Anatomy and Physiology II**
This course is an integrated approach to the structure and function of the gastrointestinal, cardiovascular, immunological, respiratory, excretory, and reproductive systems with an emphasis on the maintenance of homeostasis. Laboratory exercises include histological examinations, anatomical dissections and physiological experiments using human subjects. (Pre-requisite: (BIOL-123 and BIOL-124 and BIOL-125 and BIOL-126) or (BIOL-123 and BIOL-124) or (BIOL-101 and BIOL-102) or (BIOL-121 and BIOL-122) or MEDG-102 or equivalent course or NUTR-BS students.) **Lecture 3, Credits 4 (Spring)**

MEDS-280 **Laboratory Teaching Assistant**
This course provides students the opportunity to learn by teaching, as they assist the laboratory instructor in facilitating student learning. **Ind Study, Credits 1 - 3 (Fall, Spring)**

MEDS-281 **Classroom Teaching Assistant**
This course provides students the opportunity to learn by teaching, as they assist the course instructor in facilitating student learning. **Ind Study, Credits 1 - 3 (Fall, Spring, Summer)**

MEDS-289 **Special Topic**
This course is a lower division course on a topic of special interest that is not part of a formal curriculum. The course design may differ by topic or faculty member but will include prerequisites, contact hours, and examination/assessment procedures. The level of study is appropriate for students in their first two years of study. **Lec/Lab, Credits 1 - 4 (Fa/sp/su)**

MEDS-290 **Biomedical Research**
This course provides an opportunity for in-depth experiential learning through collaborative work on an independent research project. **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**

MEDS-299 **Independent Study**
This course will provide students the opportunity for independent study in a topic of strong interest. **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**

MEDS-300 **Premedical Studies Seminar**
This course prepares students to navigate the admissions process and interviews for medical, osteopathic, optometry, podiatric and dental school. The preparation will also address issues related to the field of medicine, including alternatives, ethics, and financial concerns. **Lecture 1, Credits 1 (Fall)**

MEDS-310 **Introduction to Pharmacology**
This course provides an overview of the pharmacy profession (educational requirements, professional responsibilities and opportunities, role of the pharmacist in the health care team) and a detailed look into basic pharmacodynamics, pharmacokinetic, and pharmaceutical principles. The pharmacodynamics principles covered include mechanisms of drug action, drug-receptor interaction theory, dose-response relationships, structure-activity relationships, and principles of drug metabolism. Pharmaceutical topics include formulations, drug product design, excipients, dosage forms, and elimination rate. Lastly, specific disease states will be covered that will clearly, and effectively demonstrate many of the topics taught. The diseases will be approached by presenting the etiology followed by the pharmacotherapy, including the details of the multiple drug classes that are used for any one-disease state. (Prerequisites: (MEDS-250 and MEDS-251) or (1026-350 and 1026-360) or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

MEDS-311 **Diagnosing the Criminal Mind**
This course will introduce students within the biomedical sciences, physician assistant, psychology and criminal justice fields to understand basic clinical diagnostic terms, symptoms and behaviors that pertain to clients who commit crime. The course will introduce students to the relationship between mental health, drug addiction, crime and violence. Students will be involved in mock trials, debates and case write ups. **Lecture 3, Credits 3 (Fall)**

MEDS-313 **Introduction to Infectious Diseases**
This is an advanced course in the mechanisms by which bacteria and fungi cause disease in humans. The course topics include the clinical signs of each disease, diagnosis of each disease, pathogenic mechanisms used by the organisms to cause disease, treatment of the disease, and prevention of the disease. The laboratory component of this course will consist of a mixture of methodologies used in the identification of the infectious agents, evaluation of the host response to the infection, case studies, student presentations of articles related to infectious disease and other assignments aimed at deepening the understanding the infectious disease process. (Prerequisites: (BIOL-123 and BIOL-125 and BIOL-124 and BIOL-126) or (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (MEDG-101 and MEDG-102 and MEDG-103 and MEDG-104) or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

MEDS-320 **Mastering EKG and Arrhythmia Interpretation**
This course combines theory and practice, covering the basic anatomy, physiology, pathophysiology, and terminology of the heart as well as key features of arrhythmias, their physiological consequences, signs and symptoms, accurate diagnosis and management. Through an extensive practical and "hands-on" experience with electrocardiography (EKG) machines, presentations, discussions, and clinical cases, students will learn how to perform EKGs, recognize arrhythmias and describe the differences between EKG rhythm assessments and 12-Lead EKG interpretation. This course meets the needs of many healthcare professionals. This course is designed to prepare to sit for the Cardiac Rhythm Analysis Technician (CRAT) certification examination. (General Biology or permission of instructor) **Lec/Lab 2, Credits 2 (Int)**

MEDS-333 **Patient Care**
Students will be introduced to key elements of integrated, high-quality patient care. Through lectures, videos, demonstrations, and discussions essential aspects of team-based patient care will be explored. Vital skills and behaviors such as professionalism, communication, documentation, workplace safety, patient assessment, patient positioning and transfers will be presented. Infection control, global health issues, and medications will also be examined. Students will be encouraged to share their personal experiences and thoughts about class topics. (Prerequisites: (BIOL-123 and BIOL-125 and BIOL-124 and BIOL-126) or (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or equivalent courses.) **Lec/Lab 2, Credits 2 (Spring)**

MEDS-345 **Case-Based Genetic Counseling**
This course will provide students with an inside look at the profession of genetic counseling and its patients through in-depth case studies of actual patient scenarios, role playing and lectures focused on realistic challenges faced by genetic counselors. This course will focus on combining scientific information about genetic disorders with the psychosocial aspects of counseling sessions that will give provide an accurate perspective of the profession. Students will participate in role playing exercises, keep detailed journals and participate in mock patient interviews. (Prerequisites: MEDS-245 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MEDS-355 **Introduction to Global Health**
This introductory course will evaluate the modern challenges of global health from a multidisciplinary perspective. The key concepts of global health will be discussed, including various health determinants, human rights, healthcare systems, culture's impact on health, environmental concerns, nutrition, communicable and noncommunicable diseases, women's health issues, child and adolescent health, injuries, natural disasters and complex humanitarian emergencies, poverty's impact on health and more. Students will be expected to be active learners, lead classroom activities on certain days as part of group research project presentations, and actively participate in discussions. (This class is restricted to undergraduate students with at least 2nd year standing.) **Lecture 3, Credits 3 (Fall, Spring)**

MEDS-356 **Field Studies in Molecular Epidemiology**
This is a study abroad course for students interested in a pre-medical, pre-health or global health experience in sub-Saharan Africa. It is designed for those interested in medical or graduate school, tropical infectious diseases or a public health career, that provides opportunity for foreign travel. The focus is on molecular epidemiology of tropical diseases of interest (malaria, schistosomiasis, soil-transmitted helminthiasis), for which opportunities to study are not available in the United States. Such opportunities include but are not limited to simple to complex molecular diagnostic methods and related laboratory hands on experience. (Prerequisites: This class is restricted to students with at least 2nd year standing.) **Lecture 3, Credits 3 (Spring)**

MEDS-360**Placebo, Suggestion, Research and Health**

This course provides a foundation for understanding the history and science of placebo effects with a focus on how these effects influence research design, therapeutics and health. A model of placebo effects – comprised of conditioning, expectation, social influence, and paradigm – is developed and applied to both health and common diseases in order to recognize that all health interventions are at least placebos. The question is whether they are anything more. The course structure and process include assigned readings, quizzes, creative class projects, studying advertisements, hearing from pharmaceutical company representatives, and class discussion designed to provoke critical thinking. (Prerequisites: (BIOL-123 and BIOL-125 and BIOL-124 and BIOL-126) or (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (MEDG-101 and MEDG-102 and MEDG-103 and MEDG-104) or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

MEDS-361**Applied Psychophysiology and Self-Regulation**

Learn how to change your mind. This course explores the evolving field of psychophysiology and its applications for therapeutic self-regulation in health care as well as its implications for the related fields of psychology, biomedical engineering, computer science, and medical economics. By focusing on the mind as an emergent phenomenon of bidirectional brain and body interaction, we realize how much of our own physiology we can and do self-regulate. We will review research on hypnosis, biofeedback, meditative strategies, and psychophysiological monitoring. The course structure integrates lecture, demonstration, discussion and individual self-monitoring projects. Weekly quizzes provide feedback on learning. (Prerequisites: (BIOL-123 and BIOL-125 and BIOL-124 and BIOL-126) or (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (MEDG-101 and MEDG-102 and MEDG-103 and MEDG-104) or equivalent courses.) **Lecture 3, Credits 3 (Biannual)**

MEDS-370**Community Healthcare**

This seminar course is a unique opportunity for students who are serious about pursuing a career in healthcare. The course will focus on the study of key issues concerning community health care and developing practical approaches to supporting patients. Students consider obstacles to effective health care as well as strategies for enabling at-risk patients to play a more active role in promoting their health and well-being. Topics covered include: challenges of delivering adequate healthcare in the community; population health; the concept of “under-insurance”; the business of healthcare; health literacy and measuring outcomes. Students in the course will be expected to undertake at least one subsequent internship (MEDS 475 Health Coach Practicum) with Rochester Regional Health and the Greater Rochester Independent Practice Association (GRIPA). Students complete an application before registering for this course. Acceptance into the course is contingent upon passing a screening and interview process. **Lecture 2, Credits 2 (Fall, Spring)**

MEDS-402**Biomedical Ethics**

This course will explore key ethical principles, guidelines and regulations that inform decision making and best practices in biomedical research, public health and clinical medicine including issues of informed consent, experimental design, acceptable risk, research integrity, medical errors, for-profit medicine, refusal of care, end-of-life decisions, physician assisted death, substance abuse and ethical use of animals in research. Students will also have multiple opportunities to further develop critical thinking and effective professional communication skills in a seminar format. (Prerequisites: (BIOL-123 and BIOL-125 and BIOL-124 and BIOL-126) or (BIOL-101 and BIOL-102) or (BIOL-121 and BIOL-122) or (MEDG-101 and MEDG-102) and (UWRT-150 or ENGL-150 or ISTE-110) or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

MEDS-403**US Healthcare**

The course will explore the beginnings of the healthcare delivery in America, and the economics of the healthcare enterprise. It will also explore the role of government in providing and regulating the delivery of healthcare services as well as ethical issues that affect the doctor-patient relationship. Finally, the course will examine the healthcare systems of other industrialized nations and compare and contrast those systems with that of the U.S. **Lecture 3, Credits 3 (Spring)**

MEDS-411**Researching the Criminal Mind**

This course will introduce students to clinical research as it pertains to symptoms, behaviors, the prediction of violent behaviors and treatment outcomes among offenders who commit crime. The course will introduce students to evidenced based science and the application to forensic populations, manuscript preparation, clinical case write ups and small grant proposals. (Prerequisites: MEDS-311 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

MEDS-415**Pathophysiology of Organ Systems I**

This course is designed to provide the students with the necessary foundation of the physiologic and pathologic processes that underlie the spectrum of human disease entities and is taught in the context of clinical scenarios that demonstrate the basic science principles in a real-world context of health care. Emphasis is placed on the fundamental principles of cell injury and repair, infection, neoplasia, and inflammation as well as hemodynamic disorders, thromboembolic disease and shock. Additional emphasis is placed on organ systems and their disorders such as the circulatory, liver, gallbladder and biliary systems. Material is presented in the context of case studies, utilizing clinical findings and addressing underlying basic physiologic, biochemical and immunologic processes as they relate to patient care and individual patient problem cases. (Prerequisites: Restricted to students in the College of Health Sciences & Technology with at least 3rd year standing who have completed MEDS-250 and MEDS-251 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

MEDS-416**Pathophysiology of Organ Systems II**

This course is second in a sequence designed to provide the students with the necessary foundation of knowledge and understanding of the physiologic and pathologic processes that underlie the spectrum of human disease entities and is taught in the context of clinical scenarios that demonstrate the basic science principles in a real-world context of health care. Emphasis is placed on the pathophysiology of the central nervous system, lower urinary tract, male and female reproductive organs, gastrointestinal tract, spleen, pancreas, kidneys and endocrine system. Material is presented in the context of case studies, utilizing clinical findings and addressing underlying basic physiologic, biochemical and immunologic processes as they relate to patient care and individual patient problem cases. (Prerequisites: MEDS-415 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MEDS-417**Clinical Microbiology**

Clinical microbiology is a detailed study of the bacteria, viruses, fungi, and parasites relevant to human infectious diseases, including their historical significance and impact on society. This course will also focus on giving the student an appreciation and clear understanding of emerging/re-emerging infectious disease agents particularly those infectious disease agents commonly encountered in a hospital setting. (Prerequisites: (BIOL-123 and BIOL-125 and BIOL-124 and BIOL-126) or (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (MEDG-101 and MEDG-102 and MEDG-103 and MEDG-104) or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

MEDS-418**Clinical Microbiology Lab**

Clinical microbiology is a detailed study of the bacteria, viruses, fungi, and parasites relevant to human infectious diseases, including their historical significance and impact on society. This course provides a hands-on experience in identifying these types of agents. The course will also focus on giving the student an appreciation and clear understanding of emerging/re-emerging infectious disease agents particularly those infectious disease agents commonly encountered in a hospital setting. (Prerequisites: (BIOL-123 and BIOL-125 and BIOL-124 and BIOL-126) or (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (MEDG-101 and MEDG-102 and MEDG-103 and MEDG-104) or equivalent. Co-requisite: MEDS-417 or equivalent.) **Lab 2, Credits 1 (Spring)**

MEDS-421**Parasitology**

Introduction to parasites of medical importance and the diseases they cause. It includes study of a variety of parasites classified by diseases such as blood and intestinal protozoan parasites, nematodes, trematodes, and cestodes. Examples of important parasitic diseases to be covered include malaria, sleeping sickness, elephantiasis, river blindness, leishmaniasis, amebic dysentery, and babesiosis. Coursework includes an examination of the distribution and transmission, pathogenesis, clinical signs and symptoms, diagnosis, treatment, and control. Contribution of parasitic infections to economic and health inequities between developed and developing countries will be analyzed. (Prerequisites: (MEDG-101 or MEDG-102 or BIOL-101 or BIOL-102 or BIOL-121 or BIOL-122 or BIOL-123 or BIOL-124) or equivalent course and at least 3rd year student standing.) **Lecture 3, Credits 3 (Spring)**

MEDS-422**Endocrinology**

This course will combine lecture, literature review, and small group discussions/presentations to introduce students to the fundamental concepts of human endocrinology. Topics covered will include: digestion and metabolism; growth and aging; arousal/mood; sexual dimorphism and reproduction; and neuroendocrinology. Discussion of relevant human diseases/disorders will be used to illustrate related biochemical/anatomical pathways and mechanisms. (Prerequisites: MEDS-250 and (MEDS-242 or BIOL-201 or BIOL-302) or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

MEDS-425**Introduction to Neuroscience**

This course will focus on the human nervous system, and its regulation of behavior and complex function. Background information on neuroanatomy, cellular physiology, neurotransmission, and signaling mechanisms will pave the way for an in-depth analysis of specialization at the systems level. Our goal will be to understand the cellular and molecular mechanisms underlying normal human behaviors and pathogenic states. (Prerequisites: MEDS-250 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

MEDS-426

Addiction Pharmacology

This course will explore the general concepts, social consequences, policy, and other aspects of substance abuse and addiction. Multiple perspectives will be presented, including those of addicts, health-care providers, and family/friends affected by addiction. Then, commonly abused drugs will be discussed in detail. Topics to be presented and discussed for each drug class include: epidemiology, pathophysiology, drug class information, pharmacokinetic and pharmacodynamics actions, short-term and long-term consequences of misuse (including overdose), and contemporary pharmacological and non-pharmacological treatment modalities. Availability of resources used to address substance abuse will also be presented. (Prerequisites: (MEDS-311) or (BIOL-101 and BIOL-102) or (BIOL-121 and BIOL-122) or (MEDG-101 and MEDG-102) or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MEDS-430

Epidemiology

The course covers applications of epidemiology to the study of the distribution and determinants of health and diseases, morbidity, injuries, disability, and mortality in populations. Epidemiologic methods for the control of conditions such as infectious and chronic diseases, community and environmental health hazards, and unintentional injuries are discussed. Other topics include quantitative aspects of epidemiology, including data sources; measures of morbidity and mortality; evaluation of association and causality; and various study design methods. Contemporary topics in public health (e.g. swine flu, HIV/AIDS, SARS), outbreak investigation, and containment strategies will be examined, analyzed, and thoroughly discussed. (Prerequisites: (MEDG-101 or MEDG-102 or BIOL-101 or BIOL-102 or BIOL-121 or BIOL-122 or BIOL-123 or BIOL-124) or equivalent course and at least 3rd year student standing.) **Lecture 3, Credits 3 (Spring)**

MEDS-440H

Cardiac Imaging

This is an upper division course for students interested in the medical imaging of the heart. Students will review the anatomy and physiology of the heart and learn about the different imaging techniques used in the clinical diagnosis and assessment of cardiac disease or disorders. Students will read, discuss, and present related journal articles related to the subject matter. (Prerequisites: (MEDS-250 and MEDS-251) or (1026-350 and 1026-360) or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

MEDS-460

Principles of Toxicology

This course introduces fundamental concepts of environmental toxicology, including toxicokinetics, toxicodynamics, biotransformation, modifiers of toxicity, genetic toxicology, and environmental epidemiology. Introductory material will be presented within each lecture complemented by a class discussion of a scientific paper relevant to each lecture block. (Prerequisites: BIOL-201 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

MEDS-470

Examining the Clinical Experience

This course builds off of the clinical experiences of students currently working or volunteering in a clinical setting. The course will include informal and formal writing assignments. Topics addressed include the following: the roles of the various healthcare professionals; understanding sensitivity and diversity; logistics of the health care system – in-patient and out-patient; privacy and safety issues associated with patients and care providers; documentation methods. (Currently volunteering or working in a healthcare setting) (Prerequisites: Students with at least 2nd year standing who has completed First-Year Writing and is currently working or volunteering in a healthcare position.) **Lecture 1, Credits 3 (Fall)**

MEDS-475

Health Coach Practicum

This course is a continuation of MEDS 370 and provides an opportunity for students to apply key concepts in health coaching to assist members of the community. Students will cover such topics as self-management, motivational interviewing, cultural competency and goal setting. Students will have the opportunity to collaborate with health care professionals in identifying barriers to healthcare as well as creating ways to improve patient outcomes. Journaling and progress notes are writing formats that will be covered and provide the student with a way to express their experiences in both a reflective and a professional manner. (Prerequisites: MEDS-370 or equivalent course.) **Clinical 3, Credits 3 (Fall, Spring)**

MEDS-475

Health Coach Practicum

This course is a continuation of MEDS 370 and provides an opportunity for students to apply key concepts in health coaching to assist members of the community. Students will cover such topics as self-management, motivational interviewing, cultural competency and goal setting. Students will have the opportunity to collaborate with health care professionals in identifying barriers to healthcare as well as creating ways to improve patient outcomes. Journaling and progress notes are writing formats that will be covered and provide the student with a way to express their experiences in both a reflective and a professional manner. (Prerequisites: MEDS-370 or equivalent course.) **Lecture 1.5, Credits 3 (Fall, Spring)**

MEDS-489

Special Topics

This course is an upper division course on a topic of special interest that is not part of a formal curriculum. The course design may differ by topic or faculty member but will include prerequisites, contact hours, and examination/assessment procedures. The level of study is appropriate for students in their final two years of study. **Lec/Lab, Credits 1 - 4 (Fall, Spring, Summer)**

MEDS-490

Human Gross Anatomy

This course exposes students to details of human anatomy through cadaver dissection. Lecture material stresses functional and clinical correlates corresponding to laboratory exercises. (Prerequisites: (MEDS-250 and MEDS-251) or (1026-350 and 1026-360) or equivalent courses.) **Lab 6, Credits 4 (Spring)**

MEDS-490

Human Gross Anatomy

This course exposes students to details of human anatomy through cadaver dissection. Lecture material stresses functional and clinical correlates corresponding to laboratory exercises. (Prerequisites: (MEDS-250 and MEDS-251) or (1026-350 and 1026-360) or equivalent courses.) **Lecture 3, Credits 4 (Spring)**

MEDS-499

Biomedical Sciences Co-op

One semester of paid work experience in a healthcare related field. **CO OP, Credits 0 (Fall, Spring, Summer)**

MEDS-501

Human Development

This course will provide a survey of the primary biological events, mechanisms and underpinnings of human development from conception through aging. It will use case studies, human clinical and laboratory research papers to enrich and illustrate key points related to human developmental milestones. A significant emphasis will be placed on understanding developmental disabilities and adult-onset degenerative disorders, and also in relating biological events to an individual's larger psychosocial functioning. Students will also improve professional communication skills through discussions, writing and revision. (Prerequisites: MEDS-422 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

MEDS-510

Biomedical Research

This course provides an opportunity for in-depth experiential learning through collaborative work on an independent research project. **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**

MEDS-511

Interdisciplinary Research

This course will provide an independent, interdisciplinary research opportunity to enhance the experiential learning component of the Biomedical Sciences Program. Students will engage in preparatory reading and original research in an academic discipline or environment outside of their immediate major. Proposed work may span a broad variety of disciplines within a unifying theme of project goals and potential outcomes with strong application to human health and development. Examples may include mechanical, electrical or biomedical engineering; imaging science and optics; entrepreneurship and biotechnology; epidemiology, community health, and public policy. **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**

MEDS-515

Medical Pathophysiology

This course is designed as an introductory course in pathophysiology, the study of disease and its consequences. It covers the basic mechanisms of disease, concentrating on the diseases that are most frequently encountered in clinical practice. The major topics of discussion will emphasize the general pathologic processes; this will provide a basis for understanding diseases affecting specific organ systems. Clinical correlations will be made as examples of how physiological processes can go awry in the generation of a particular disease. (Prerequisites: (MEDS-250 and MEDS-251) or (1026-350 and 1026-360) or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

MEDS-518

Oral Microbiology

This course is designed to deliver an understanding of the microbial population of the oral cavity as it relates to health and disease. Throughout the course, the presence, absence, influence and consequences of various microbial species will be presented relative to the anatomy of the oral cavity and subsequent disease. The course will also illuminate the connection between the oral cavity, inflammation and surprising conditions chronic and acute conditions that seemingly are unrelated to the oral cavity. (Prerequisites: MEDS-417 or BIOL-204 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MEDS-520

Histology and Histopathology

This foundational course in the study of human biology and medicine provides students with a detailed exploration of the microscopic and structural anatomy of normal human tissues and organs, with special emphasis given to the relationships between the cellular architecture of human organs and organ systems and their functions. The course also examines human pathologies as a manifestation of the loss of cellular integrity leading to alterations in the histological features of diseased organs. (Prerequisites: MEDS-250 and MEDS-251 and MEDS-242 or equivalent courses.) **Lab 3, Credits 4 (Fall)**

MEDS-520**Histology and Histopathology**

This foundational course in the study of human biology and medicine provides students with a detailed exploration of the microscopic and structural anatomy of normal human tissues and organs, with special emphasis given to the relationships between the cellular architecture of human organs and organ systems and their functions. The course also examines human pathologies as a manifestation of the loss of cellular integrity leading to alterations in the histological features of diseased organs. (Prerequisites: MEDS-250 and MEDS-251 and MEDS-242 or equivalent courses.) **Lecture 3, Credits 4 (Fall)**

MEDS-525**Advanced Clinical Neuroanatomy**

This is an integrated course encompassing lectures, laboratory exercises and clinical case discussions. Laboratory exercises will focus on detailed examination of the human brain as well as the internal circuitry of myelin-stained sections through the spinal cord, brainstem, and fore-brain. The exercises will reinforce concepts stressed in lectures and clinical case discussions. (Prerequisites: MEDS-425 or equivalent courses.) **Lec/Lab 4, Credits 3 (Fall)**

MEDS-530**Human Immunology**

Introduction to the fundamental facts and concepts on immunology to include: innate and adaptive immunity; cells, molecules, tissues and organs of the immune "system"; cell communication and interaction; antibody structure and function; and the application of these concepts to infectious diseases, vaccine design, autoimmune diseases, cancer, transplantation, regulation of the immune response, allergic reactions and immunosuppression. Students will gain an understanding of immunological principles and techniques, and their application to contemporary research, with results from instructor's research laboratory (Prerequisites: (BIOL-101 and BIOL-102) or (BIOL-121 and BIOL-122) or (BIOL-123 and BIOL-125 and BIOL-124 and BIOL-126) or (MEDS-250 and MEDS-251) or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

MEDS-589**Special Topics**

This course is an upper division course on a topic of special interest that is not part of a formal curriculum. The course design may differ by topic or faculty member but will include prerequisites, contact hours, and examination/assessment procedures. The level of study is appropriate for students in their final two years of study. **Lecture, Credits 1 - 4 (Fall, Spring, Summer)**

MEDS-599**Independent Study**

This course will provide students the opportunity for independent study in a topic of strong interest. **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**

Diagnostic Medical Sonography**DMSO-289****Special Topics**

This course is on a topic of special interest that is not part of a formal curriculum. The course design may differ by topic or faculty member but will include prerequisites, contact hours, and examination/assessment procedures. The level of study is appropriate for students in their final two years of study. **Lec/Lab, Credits 1 - 4 (Fall, Spring, Summer)**

DMSO-301**Sonographic Scanning Skills and Techniques I**

The course provides students with hands-on experience by performing basic and general abdominal, small parts, obstetrical and gynecological ultrasound examinations. Sonographic examination protocols and techniques, review and recognition of normal anatomic structures, high quality image production, and image interpretation are stressed. (Prerequisites: DMSO-BS or DMSO-CT and YR 3) **Lec/Lab 6, Credits 3 (Fall)**

DMSO-302**Sonographic Scanning Skills and Techniques II**

The course is a continuation of Sonographic Scanning Skills and Techniques I (DMSO-301). The course provides students with further hands-on opportunities to perform advanced abdominal and OB/GYN, peripheral vascular (upper and lower) and carotid Doppler examinations including color flow. Ultrasound examination protocols and techniques, review and recognition of normal anatomic structures, high quality image production, Doppler and color flow optimization and image interpretation are stressed. (Prerequisites: DMSO-301 or equivalent course.) **Lec/Lab 6, Credits 3 (Spring)**

DMSO-309**Sonography Physics and Instrumentation I**

This course addresses how the principles of ultrasound physics are directly applied to the use of ultrasound instrumentation in medical imaging. Transducers, signal production, memory systems, data display, manipulation of controls, and artifacts, are discussed. Throughout the course, the student will integrate previous knowledge of anatomy with ultrasound physics and instrumentation. (Prerequisites: PHYS-112 or equivalent course and student standing in DMSO-CT, DMSO-BS or ECHO-CT.) **Lec/Lab 6, Credits 3 (Fall)**

DMSO-310**Sonography Physics and Instrumentation II**

This course is a continuation of Sonography Physics and Instrumentation I (DMSO-309). It provides a foundation of the basic physical principles of ultrasound and the fundamentals of fluid dynamics, Doppler physics including color, power, and spectral Doppler, quality control, Doppler artifacts, and biological effects. Students will learn to integrate previous knowledge of anatomy, ultrasound physics and instrumentation with Doppler skills and techniques. Development of scanning techniques, use of instrument controls, and production of high quality diagnostic images utilizing laboratory equipment are stressed. (Prerequisites: DMSO-309 or equivalent course.) **Lec/Lab 6, Credits 3 (Spring)**

DMSO-312**Human Cross-Sectional Anatomy**

This course covers basic sectional anatomy of the abdomen, pelvis, fetus and small parts, building on the basic knowledge of anatomy. This course prepares the student to recognize sectional anatomy of major human structures, especially as they relate to medical imaging techniques. Lectures are augmented with exercises using prepared human sections, organ modeling, and diagnostic imaging units. (Prerequisites: DMSO-BS or DMSO-CT and YR 3) **Lecture 3, Credits 3 (Fall)**

DMSO-414**Sonographic Vascular Evaluation**

This course provides knowledge of general vascular evaluation with an emphasis on the Sonographic approach. Two-dimensional real-time imaging and Doppler techniques are presented as well as a discussion of other imaging modalities and their use in vascular evaluation. Performance of examinations on laboratory equipment is stressed. (Prerequisites: DMSO-BS or DMSO-CT and YR 4) **Lec/Lab 3, Credits 3 (Spring)**

DMSO-452**Obstetrical Sonography I**

This course provides the ultrasound candidate with the knowledge necessary to perform obstetrical examinations. High-quality image production, recognition of normal structures, and basic pathologic states are stressed. Examination protocols, review of specific anatomy and pathology, film reading, and use of other imaging techniques are also addressed. (Prerequisites: DMSO-BS or DMSO-CT and YR 4) **Lec/Lab 3, Credits 3 (Fall)**

DMSO-453**Gynecological Sonography**

This course provides the information necessary to perform basic and advanced gynecologic Sonographic examinations. Examination strategies for various procedures are explored, as well as the integration of ultrasound into established clinical practices. (Prerequisites: DMSO-BS or DMSO-CT and YR 4) **Lec/Lab 4, Credits 3 (Fall)**

DMSO-454**Obstetrical Sonography II**

This course provides information necessary to perform more sophisticated obstetrical procedures utilizing ultrasound equipment. Examination strategies for various procedures are explored as well as the integration of ultrasound into established clinical practices. (Prerequisites: DMSO-BS or DMSO-CT and YR 4) **Lec/Lab 3, Credits 3 (Spring)**

DMSO-456**Abdominal and Small Parts Sonography I**

Laboratory simulation and classroom instruction are used to develop practical skills and clinical knowledge necessary to perform basic abdominal and small parts examinations utilizing ultrasound equipment. High-quality image production, recognition of normal abdominal structures and basic pathologic states are stressed. Examination protocols, review of anatomy, film reading, and use of other scanning techniques are addressed. (Prerequisites: DMSO-BS or DMSO-CT and YR 4) **Lec/Lab 4, Credits 3 (Fall)**

DMSO-457**Abdominal and Small Parts Sonography II**

This course is a continuation of Abdominal and Small Parts Sonography I (DMSO-456). Laboratory simulation and classroom instruction are used to develop the practical skills and clinical knowledge necessary to perform basic and advanced abdominal and small parts examinations utilizing ultrasound. High-quality image production, recognition of normal abdominal structures and basic and advanced pathologic states are stressed. Examination protocols, review of anatomy, film reading and use of other scanning techniques are addressed. (Prerequisites: DMSO-BS or DMSO-CT and YR 4) **Lec/Lab 4, Credits 3 (Spring)**

DMSO-460**Administration and Research in Sonography**

Speaking, writing, and researching skills are explored. Methods of basic research, developing writing strategies, and oral presentations are stressed. Students develop or critique a research project and prepare a written document following common publishing guidelines in addition to making oral presentations. Additionally, candidates prepare a complete plan for an ultrasound department as if they had been hired to establish a new department in a hospital setting. The candidates work together to develop the physical facilities, administrative, and financial aspects of a department. (Prerequisites: DMSO-BS or DMSO-CT and YR 4) **Lecture 3, Credits 3 (Spring)**

DMSO-570

Clinical Sonography I

This course prepares the student for application of classroom knowledge to the practice of ultrasound by means of a clinical internship. Performing basic general ultrasound examinations in the areas of abdomen, small parts, obstetrics, gynecology and basic peripheral vascular in both the laboratory and clinical settings is stressed. Nursing procedures, ethical issues, and medico-legal considerations are also discussed as they relate to the practice of ultrasound examinations. This is an internship course. (Prerequisites: DMSO-BS or DMSO-CT and YR 4) **Lec/Lab 7, Credits 7 (Fall)**

DMSO-571

Clinical Sonography II

This course provides the final development of ultrasound examination skills by means of clinical internship. The candidate is expected to perform basic and advanced general ultrasound examinations in the areas of abdomen, small parts, obstetrics, gynecology and peripheral ultrasound examinations with no assistance by the end of this course. This is an internship course. (Prerequisites: DMSO-570 or equivalent course.) **Lec/Lab 5, Credits 5 (Spring)**

Department of Clinical Health Professions

DCHP-301

Spirituality, Religion, and Medicine

This course will explore the relationships between spirituality, religion, and medicine as these influence and impact health, well-being, illness, and patient care. The course will provide students with a broad exposure to various dimensions of health, an overview of religion and spirituality, the interface between family, illness, and cultural competence and how current research guides this discussion. An introduction of various religious affiliations and belief systems will be presented as they relate to individual health, well-being, and illness. Strategies for incorporating and integrating religion and spirituality into medicine will be reviewed. Discussions will also include the benefits, barriers, challenges and medical ethics surrounding these strategies and initiatives using real-world case studies and examples. **Lecture 3, Credits 3 (Fall)**

DCHP-365

Neurological Disease and Behavior

This course focuses on clinical and pathological aspects of neural processes associated with mental activity, cognitive function, emotional states, and social behavior. This course addresses functional behavioral neuroanatomy, administering and interpreting mental status examinations, the neurochemical bases and pharmacological management of cognitive, emotional, and behavioral disturbances detected within forensic populations. This course addresses theory and methods that allow an integration of core knowledge of cognitive psychology and key biological bases of complex behavior. This course will provide an overview of methods in clinical and cognitive neuroscience with exposure to methodology. The methodological and conceptual basis of neuroscience are considered and the course emphasizes both a functional and an anatomical approach to the study of brain-behavior relationships. Specific neurobehavioral syndromes and neuropsychiatric manifestations of neurological disorders are discussed. **Lecture 3, Credits 3 (Fall)**

DCHP-465

Assessment and Differential Diagnosis in Forensic Psychology

This course addresses general and specific topics in criminal forensic assessment. Students will become familiar with the administration, scoring, and interpretation of instruments used to assess competence to stand trial, criminal responsibility, malingering, dangerousness, and risk of sexual violence among forensic clients. In order to demonstrate familiarity and knowledge of specific forensic assessment tools, each student will administer, score, and interpret test protocols and provide interpretations of test data with regard to the issue at hand. Finally, students will gain an understanding of the integration of interview data, assessment data, and collateral information in a forensic evaluation report. **Lecture 3, Credits 3 (Fall)**

DCHP-466

Forensic Clinical Case Studies

This is an advanced course focused on the intersection of psychology and the law. The course focuses on the use of clinical mental health information in courts and other legal settings in cases that involve adults and children. The course reviews the framework of law in civil and criminal cases that are most likely to involve psychologists as forensic evaluators or expert witnesses. Forensic evaluations in criminal cases include competency to stand trial evaluations and mental health evaluations for legal purposes. The role of the clinical psychologist in conducting forensic evaluations is discussed in detail, including specific kinds of clinical and ethical challenges that may arise. Specialized evaluations within the legal system, such as violence risk assessments, substance use assessments, and intimate partner violence assessments are described. Particular attention is paid to how clinical psychologists conduct forensic evaluations for use in civil and criminal proceedings, and how their findings are communicated in the form of written reports or testimony before the court. (Prerequisites: MEDS-311 and MEDS-411 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

DCHP-565

Integrated Health Scholarship

Students in this course will be involved in carrying out one or more empirical research project through collaboration with the supervising clinical faculty and a research group. Students will meet regularly with the faculty member, read relevant forensic research articles, and collect data. Students may also participate in entering, coding, or analyzing data. Students will engage in manuscript development and professional presentations. **Lecture 1, Credits 3 (Spring)**

DCHP-565

Integrated Health Scholarship

Students in this course will be involved in carrying out one or more empirical research project through collaboration with the supervising clinical faculty and a research group. Students will meet regularly with the faculty member, read relevant forensic research articles, and collect data. Students may also participate in entering, coding, or analyzing data. Students will engage in manuscript development and professional presentations. **Project 2, Credits 3 (Spring)**

DCHP-566

Neurobiological Basis of Therapy

This course covers relationships between biological processes (on the level of genes, hormones, and neural processes) as well as structural and physiological changes that contribute to psychopathology as it is represented in the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (2000, 5th ed.). Content will focus on biological bases of behavior frequently observed among forensic populations, including learning disabilities, sociopathy, substance use, and psychotic disorders. **Lecture 3, Credits 3 (Fall)**

DCHP-567

Clinical Neuroscience II

The course focuses on clinical and imaging assessment methods, psychological testing batteries and evidence-based treatments pertaining to neurocognitive and neuropsychological disorders associated with major brain pathologies. Students will learn about evidence-based testing batteries to assess and detect neurocognitive impairments known to commonly co-occur with addiction/ substance use disorders, disorders associated with delirium, major neurocognitive disorders and mild neurocognitive disorder. Students will learn about neuropsychological testing results associated with specific brain regions involved to diagnose Alzheimer's disease, traumatic brain injury (TBI), vascular disorders, and dementia with Lewy Bodies, frontotemporal lobar degeneration (FTLD), Parkinson's disease, Huntington's disease, HIV infection and frontal lobe disorders associated with aggression and violence in forensic populations. (Prerequisites: MEDS-311 and DCHP-467 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

Echocardiography

ECHO-305

Cardiac Sectional Anatomy and Physiology

This course is designed to provide students an opportunity to learn the basic anatomy, physiology, basic pathophysiology, and terminology of the heart. Standard views, image orientation, ultrasound appearance and measurements will be stressed. Students will be required to dissect and label all sections of the human heart. Students are guided in the learning process by lecture and self-paced laboratory experience. (Prerequisites: This course is restricted to students in ECHO-CT.Co-requisite: ECHO-307 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

ECHO-307

Echocardiographic Scanning Skills and Techniques I

This course is designed to provide students with the opportunity to learn cardiac imaging procedures, sectional anatomy, and patient positions. Standard views, image orientation, ultrasound appearance and measurements will be stressed. (Prerequisites: This course is restricted to students in ECHO-CT who have completed (MEDS-250 and MEDS-251) or (1026-350 and 1026-360).Co-requisite: ECHO-305 or equivalent course.) **Lab 1, Credits 1 (Fall)**

ECHO-308

Echocardiographic Scanning Skills and Techniques II

This course is designed to provide students with the opportunity to learn advanced cardiac imaging procedures, sectional anatomy, and patient positions. In-depth and advanced review of standard views, image orientation, ultrasound appearance and measurements will be stressed. (Prerequisites: This course is restricted to students in ECHO-CT who have completed ECHO-307 or equivalent course.) **Lab 1, Credits 1 (Spring)**

ECHO-320

Electrophysiology and Cardiac Pharmacology

This course exposes the student to the role of the electrocardiogram in clinical medicine and its correlation with the echocardiographic examination. The student learns how to perform a 12 Lead electrocardiogram and interpret a normal EKG. Abnormal EKG morphology, conduction disturbances, and rhythms are taught. Implications of abnormalities are discussed. (Prerequisites: This course is restricted to students in ECHO-CT.) **Lec/Lab 2, Credits 2 (Spring)**

ECHO-401**Echocardiography I**

This course is designed to provide the echocardiography student with the necessary foundation of knowledge and understanding to deal with the patient in a clinical context. It also provides the student with the information necessary to perform basic and semi-advanced cardiac procedures utilizing 2-D imaging, M-mode, and spectral and color Doppler. High-quality image production, recognition of normal cardiac structures and pathologic states relating to various types of cardiomyopathy, murmurs and valvular heart disease and cardiac transplantation are stressed. Examination protocols for various procedures, review of anatomy, film reading and use of other scanning techniques and modalities are addressed. This is an internship course. (Prerequisites: This course is restricted to students in ECHO-CT.) **Lecture 3, Credits 3 (Fall)**

ECHO-402**Echocardiography II**

A continuation of ECHO-401. The course is designed to provide the echocardiography student with the necessary foundation of knowledge and understanding to deal with the patient in a clinical context. It also provides the student with the information necessary to perform advanced and sophisticated cardiac procedures utilizing 2-D imaging, M-mode, spectral and color Doppler. High-quality image production, recognition of normal cardiac structures and pathologic states relating to cardiac diseases secondary to systemic illness, infiltrative heart, neuromuscular, and connective tissue diseases, endocrine and nutritional diseases, hematological disorders, AIDS, and pericardial diseases, cardiac tumors and thrombi, and diseases of the great vessels are stressed. Examination protocols for various procedures, review of anatomy, film reading and use of other scanning techniques and modalities are addressed. This is an internship course. (Prerequisites: This course is restricted to students in ECHO-CT that have completed ECHO-401 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

ECHO-410**Ischemic Heart Disease: Stress Echocardiography**

This course is an introduction to stress echocardiography. Emphasis is placed on the basic coronary artery anatomy, physiology, pathophysiology, medical indications, fundamental principles, techniques and scan interpretation. Various methods of stress echocardiography such as digital, exercise, and pharmacological echocardiography are stressed. Students observe and perform these procedures during a clinical internship. This is an internship course. (Prerequisites: This course is restricted to students in ECHO-CT.) **Lecture 2, Credits 2 (Fall)**

ECHO-415**Cardiac M-Mode**

Classroom and laboratory experience will provide the candidate with basic knowledge necessary to perform M-mode scans. High-quality image production, measurements, recognition of normal structures and basic pathologic states will be stressed. Examination protocols, review of specific anatomy, film reading, and use of other scanning techniques will be addressed. This is an internship course. (Prerequisites: This course is restricted to students in ECHO-CT.) **Lecture 2, Credits 2 (Fall)**

ECHO-420**Clinical Echocardiography I**

This course prepares the student for application of classroom knowledge to the practice of echocardiography by means of a clinical internship. Performing basic, and some advanced echocardiography examinations in both the laboratory and clinical settings is stressed. Nursing procedures, ethical issues and medico-legal considerations are also discussed as they relate to the practice of echocardiography. The candidate is expected to perform basic and advanced examinations with little, if any, assistance by the end of this course. This is an internship course. (Prerequisites: This course is restricted to students in ECHO-CT.) **Internship 4, Credits 4 (Fall)**

ECHO-421**Clinical Echocardiography II**

This course provides the final development of echocardiography examination skills by means of clinical internship. The candidate is expected to perform general, advanced and sophisticated echocardiography examinations with no assistance by the end of this course. This is an internship course. (Prerequisites: This course is restricted to students in ECHO-CT that have completed ECHO-420 or equivalent course.) **Internship 4, Credits 4 (Spring)**

ECHO-425**Seminar in Echocardiography**

This course is designed to introduce the student to the role of the echocardiographer, ethical issues and career opportunities in the medical field as well as provide an overview of the fiscal and daily operations of an echocardiography department. Speaking, writing, and researching skills are explored. This course also presents methods for researching a selected topic, developing paper-writing strategies, and making oral presentations. Students will research a topic and prepare a written document following common publishing guidelines in addition to making oral presentations. This is an internship course. (Prerequisites: This course is restricted to students in ECHO-CT.) **Lecture 2, Credits 2 (Spring)**

ECHO-430**Congenital Heart Disease I**

This course is designed to provide the echocardiography student with the necessary foundation of knowledge and understanding of congenital heart disease with an emphasis on the ultrasound approach. Two-dimensional real-time imaging and Doppler techniques are presented. Performance on laboratory equipment is stressed. This is an internship course. (Prerequisites: This course is restricted to students in ECHO-CT.) **Internship 2, Credits 2 (Fall)**

ECHO-431**Congenital Heart Disease II**

A continuation of ECHO-430. This course is designed to provide the echocardiography student with the necessary foundation of knowledge and understanding of advanced congenital heart disease with an emphasis on the ultrasound approach. Two-dimensional, real-time imaging and Doppler techniques are presented. Performance on laboratory equipment is stressed. This is an internship course. (Prerequisites: This course is restricted to students in ECHO-CT that have completed ECHO-430 or equivalent course.) **Internship 2, Credits 2 (Spring)**

ECHO-465**Echocardiography Special Procedures**

This course introduces the echocardiography student to the various techniques, procedures, and skills necessary to evaluate the heart. Topics include transesophageal and contrast echocardiography, and pericardiocentesis. The role of echocardiography in emergency medicine, operating rooms, and intensive care units is stressed. This is an internship course. (Prerequisites: This course is restricted to students in ECHO-CT.) **Internship 2, Credits 2 (Spring)**

Health Systems Management**HLTH-320****Legal Aspects of Health Care**

This course provides an overview of statutes and regulations as they apply to the health care system. Topics include: an overview of the American legal system; licensure of institutions; licensure and discipline of practitioners; physician-patient relationship; reproductive issues; the right to die; organ donations; medical records; legal liability; malpractice; and labor law. **Lecture 3, Credits 3 (Spring)**

HLTH-325**Health Care Leadership**

Highly trained clinical and administrative professionals drive the nature of work in health care. The purpose of this course is to provide students the opportunity to study leadership theory as it is applied in health care organizations. Leadership theories and applications geared toward professionals working in health service organizations will be emphasized. Students will learn to apply leadership theories via case studies and issue analysis of their active work environments. **Lecture 3, Credits 3 (Fall, Spring)**

HLTH-328**Finance for Health Care Professionals**

This is an overview course that will provide an in-depth investigation of the financial workings in the health care industry. The course will be presented through the investigation of the operations of various health care settings – hospitals, physician practices, long term care facilities and home health care providers. The course covers all the essential functions in health care internal financial operations that would be experienced throughout the industry, except for the insurance companies. There are several examples involving physician practices, inpatient hospitals, clinics, nursing homes, etc. During the course the participants will carefully evaluate what the finance department is expected to accomplish. They will better understand the role of the clinical operations manager in the financial health of a health care organization. The course is designed to provide an approach that includes some terminology used in accounting, but more so those terms associated with finance. **Lecture 3, Credits 3 (Fall, Spring)**

HLTH-330**Health Planning and Program Development**

This course provides a review of the methodology of planning effectively for health care services. The use of data systems and the methods of forecasting, identifying, and analyzing problems are explored. The course will all address the process of strategic planning, setting priorities, developing projects and allocating resources. Students prepare actual application for new programs to regulatory agencies. **Lecture 3, Credits 3 (Spring)**

HLTH-508**Integrated Health Systems and Population Health**

This course discusses the delivery system of health care in the US. Specifically, the course will review the current status of American health care including research into population demographics and health and the concept of wellness and prevention. Following this a review of international health care models will occur to consider best practice as alternative care models for consideration for the US. In addition, the students will develop, for their area of interest and expertise, a strategy for incremental or radical innovation in how we provide health care to our constituents. (A minimum of 3rd year standing is required to enroll.) **Lecture 3, Credits 3 (Spring)**

HLTH-510**Global Health Systems**

This course will evaluate the modern challenges of global health from a multidisciplinary perspective. The key concepts of global health will be discussed, including various health determinants, human rights, health care systems, culture's impact on health, environmental concerns, nutrition, communicable and noncommunicable diseases, women's health issues, child and adolescent health, injuries, natural disasters and complex humanitarian emergencies, poverty's impact on health and more. Students will be expected to be active learners, leading classroom activities on certain days as part of group research project presentations, and actively participate in discussions. (A minimum of 3rd year standing is required to enroll.) **Lecture 3, Credits 3 (Fall)**

HLTH-511 **Emergency Management in Health Care**
The purpose of this course is to describe the fundamental attributes of emergency management to provide students with a foundation of understanding of the field, while also providing students with a basic understanding of how public health, medical, and health care services function as a part of disaster and emergency management. This course provides an introduction to emergency management and the role the health care organizations (public health, medicine, etc.) play in in the four phases of emergency management (mitigation, preparedness, response, and recovery) and its core functions. Students will learn how to apply the core functions of emergency management in health-related disasters and other emergencies to identify solutions and methods to improve emergency management practice. (Prerequisites: HLTH-508 or equivalent course and at least 3rd year standing.) **Lecture 3, Credits 3 (Spring)**

HLTH-512 **Cultural Competency in Global Health**
The Centers for Disease Control and Prevention and the World Health Organization are two of many health organizations that have emphasized the importance of cultural competence in health care. As our society becomes more global, sensitivity to and respect for various cultural norms is an integral component of health care delivery. This course defines cultural competency both in theory and in practice. Select topics to be addressed include: Introduction to cultural competency; diversity, equity and inclusion; how cultural competency impacts health practice; health disparity; language and communication; culture and health literacy; cultural competency; strategies for cultural competency assessment; practicing cultural competency, etc. (Prerequisites: HLTH-508 or equivalent course and at least 3rd year standing.) **Lecture 3, Credits 3 (Spring)**

Physician Assistant

PHYA-206 **Medical Microbiology**
This course will introduce students to key elements and concepts of the biology of human pathogens. Students will study how this understanding impacts the therapeutic modalities for the treatment and prevention of human infectious disease. Through this learning process, students will gain an understanding as to how these topics directly relate to future roles as healthcare providers. (This course is restricted PHYA-BS students with at least 2nd year standing.) **Lecture 3, Credits 3 (Spring)**

PHYA-401 **History and Physical Diagnosis I**
This is the first in a two-course sequence which introduces and develops the clinical psychosocial skills and anatomic/physiologic science involved in interviewing and examining patients. This course includes practical medical terminology, attitude development and values clarification strategies to aid students in adopting a humanistic approach, interviewing techniques used during patient interaction, comprehensive database development, demonstrated techniques for complete physical examination of all body systems and explanation/implementation of the Problem-Oriented Medical Record (POMR). The course involves weekly patient contact. (This course is restricted PHYA-BS students with at least 3rd year standing.) **Lecture 6, Credits 4 (Fall)**

PHYA-402 **History and Physical Diagnosis II**
This second of a two-course sequence introduces and develops the clinical psychosocial and anatomic/physiologic science involved in examining patients. The course includes performing and writing complete, accurate medical histories and physical examinations with small group instruction. Weekly patient contact. (Prerequisites: PHYA-401 or equivalent course.) **Lecture 6, Credits 4 (Spring)**

PHYA-405 **Pathophysiology I**
This introductory course in the Pathophysiology of Disease course sequence will present the physician assistant student with normal and abnormal function of cells in general, illustrating how these cellular abnormalities affect function of specific organ systems. The respiratory, renal, and cardiovascular organ systems will be highlighted and mechanisms of neoplasia will be introduced. The endocrine, and gastrointestinal organ systems will be highlighted. (This course is restricted PHYA-BS students with at least 3rd year standing.) **Lecture 2, Credits 2 (Fall)**

PHYA-406 **Pathophysiology II**
This second course is the second in a two-part sequence that introduces the physician assistant student to the normal and abnormal cellular and physiologic processes that underlie many human diseases. Hematologic, pulmonary, immune, and neurologic systems will be covered during this semester. Understanding of how these abnormalities affect clinical laboratory data will also be acquired. (This course is restricted PHYA-BS students with at least 3rd year standing.) **Lecture 2, Credits 2 (Spring)**

PHYA-409 **Clinical Lab Medicine**
This course will investigate the appropriate use and interpretation of commonly utilized laboratory tests. Students will be asked to predict results that would be expected to occur in the setting of various diseases. In addition, a significant component of this course will be to introduce the student to the principles of electrocardiogram (EKG) interpretation. By the end of the course, students should be able to interpret both normal 12 lead EKGs as well as commonly encountered abnormal EKGs, with an emphasis on ischemia and infarction. (This course is restricted PHYA-BS students with at least 3rd year standing.) **Lec/Lab 1, Credits 1 (Spring)**

PHYA-415 **Pharmacology I**
This introductory course in the Clinical Pharmacology course sequence presents the physician assistant student with the necessary foundation of knowledge to safely and effectively prescribe medication for common and/or important disorders. The course will begin with a study of the mechanics of pharmacology: pharmacodynamics and pharmacokinetics. Following this introduction, an organ systems approach, paralleling the systems presented in Clinical Medicine I, is utilized to study medications relevant to gastrointestinal disease. (This course is restricted PHYA-BS students with at least 3rd year standing.) **Lecture 1, Credits 1 (Fall)**

PHYA-416 **Pharmacology II**
This is the second course in the Clinical Pharmacology course sequence that presents the physician assistant student with the necessary foundation of knowledge to safely and effectively prescribe medication for common and/or important disorders. Course content will complement material presented simultaneously in the Clinical Medicine II course including key concepts of pharmacodynamics and pharmacokinetics. These will be utilized to study medications relevant to treat diseases. (Prerequisites: PHYA-415 or equivalent course.) **Lecture 2, Credits 2 (Spring)**

PHYA-417 **Pharmacology III**
This is the final course in the Clinical Pharmacology course sequence that presents the physician assistant student with the necessary foundation of knowledge to safely and effectively prescribe medication for common and/or important disorders. Course content will complement material presented simultaneously in the Clinical Medicine III course including key concepts of pharmacodynamics and pharmacokinetics. These will be utilized to study medications relevant to treat diseases with a focus on the pediatric and geriatric populations. (Prerequisites: PHYA-416 or equivalent course.) **Lecture 2, Credits 2 (Fall)**

PHYA-419 **Advanced Gross Anatomy**
This is a course designed as a laboratory-intensive overview of normal structure in prosected (dissections performed ahead of time by staff) examples of cadaver anatomy. Special emphases will be placed on the anatomical correlates associated with upper/lower extremity, neck, and back muscle groups/joints/bones, peripheral nerve plexuses (including spinal and cranial nerves), major arterial/venous pathways, and body viscera in areas of the head/neck, thorax, abdomen, and pelvis. Where appropriate, evidence of pathologies will be discussed at the cadaver side. Additionally, students will participate in clinical case presentations that correspond to the particular dissection subject at-hand throughout the term. (This course is restricted PHYA-BS students with at least 3rd year standing.) **Lec/Lab 2, Credits 2 (Fall)**

PHYA-420 **PA Seminar**
This course provides physician assistant students with an introduction to the PA profession. The course encompasses historical origins and early educational models. The course covers various professional entities; licensure, certification, accreditation, professional organizations, and medical ethics. (This course is restricted PHYA-BS students with at least 3rd year standing.) **Lecture 1, Credits 1 (Fall)**

PHYA-421 **Diagnostic Imaging**
This course introduces the PA student to the most clinically relevant diagnostic imaging modalities, emphasizing the risks and benefits of different modalities, as well as the appropriate indications for obtaining a variety of radiographic studies. The student will be exposed to the most common plain radiographic diagnoses likely to be encountered in clinical practice as well as important life threatening diagnoses. At the conclusion of this course, the student will have foundational skills and competency to interpret plain radiographs demonstrating these important diagnoses. (This course is restricted to students in PHYA-BS with at least 4th year standing.) **Lecture 2, Credits 2 (Fall)**

PHYA-422 **Clinical Medicine I**
This is the first of the Clinical Medicine sequence of courses. The student will be presented with the necessary foundation of knowledge to begin to understand the patient's condition within a clinical context. An organ systems approach is utilized in this course to study diseases of the skin, ears, oral cavity, ophthalmology, upper respiratory tract, endocrine system, and gastrointestinal tract. Principles of preventive medicine will be woven throughout the curriculum. An introduction to disorders involving the cardiovascular system will complete the semester. (This course is restricted PHYA-BS students with at least 3rd year standing.) **Lecture 10, Credits 5 (Fall)**

PHYA-423**Clinical Medicine II**

This is the second in the sequence of Clinical Medicine courses. The course will present the physician assistant student with the necessary knowledge to understand the patient within a clinical context. A body systems approach is utilized in this course to study diseases of the cardiovascular, selected endocrine topics, renal, men's health, heme/oncology, pulmonary, and nervous systems. Principles of preventive medicine will be woven throughout the curriculum. (Prerequisites: PHYA-422 or equivalent course.) **Lecture 10, Credits 5 (Spring)**

PHYA-424**Clinical Medicine III**

This is the final course in the Clinical Medicine sequence of courses and is designed to complete the introduction to human disease. The format will be primarily a population-based approach to presenting disease. The unique diseases and developmental issues encountered in pediatrics, geriatrics, and women's health will be addressed. An introduction to the important medical issues relevant to caring for surgical patients will be presented. Psychiatric illness, geriatrics, musculoskeletal and rheumatology will be presented. Special topics of trauma, burns, and emergency medicine will complete the course. The principles of preventive medicine will continue to be integrated throughout the curriculum. (Prerequisites: PHYA-423 or equivalent course.) **Lecture 10, Credits 5 (Fall)**

PHYA-430**Clinical Genetics**

This course provides students with an introduction to medical genetics and relevant diseases, syndromes, and clinical disorders. Course focuses on major disorders as subgroups and provides relevant overviews of associated diseases and syndromes within each subgroup. Course also confronts current needs and comprehensive nature of genetic counseling, detailing various patient populations in which this is critical. (This course is restricted PHYA-BS students with at least 3rd year standing.) **Lecture 2, Credits 2 (Spring)**

PHYA-440**Society and Behavioral Medicine**

This course is the introduction to professionalism, professional behaviors for the PA, and behavior science for the PA student. We will explore stereotypes and providers' inappropriate (or lack of) knowledge and how this might influence access to care. The focus is non-somatic medical skills and knowledge needed to become a clinician who manages these issues with insight into human behavior. Topics will include issues related to age, socioeconomic status, cultural, racial, religious, ethnic and family diversity etc. We will seek out and develop tools to recognize facets (including risk factors for and signs/symptoms) of the above issues and of abuse issues. Setting this foundation in basic psychopathology and its relationship to understanding human illness is core to the PA student's developing professionalism. (This course is restricted to students in PHYA-BS with at least 4th year standing.) **Lecture 3, Credits 3 (Fall)**

PHYA-510**Hospital Practice**

The student will begin working with hospitalized patients prior to their clinical year of rotations in small group lead instruction. This course engages the student in the critical thinking process used in the daily care and management of a patient. Student-generated patient cases (from hospital work) will be utilized to work through the critical thinking process that is employed in the day-to-day management of a patient. Enhancement of the development of differential diagnosis, assessment and the treatment plans will be emphasized. Order writing, daily progress notes and clinical procedures for each case will be thoroughly explored. (This course is restricted to students in PHYA-BS with at least 4th year standing.) **Lecture 6, Credits 4 (Fall)**

PHYA-520**Clinical Integration**

This course builds upon the foundation developed during the professional didactic phase of the physician assistant program. Drawing upon this foundation, students will analyze simple and complex case-based patient scenarios. Working individually and in groups, and using computer-assisted patient simulators when possible, the students will be asked to gather data from physical examination, and EKG and laboratory data. Based on the data gathered, the student will recommend further diagnostic evaluations, suggest appropriate treatment, and develop follow-up plans based on the scenario presented. The development of thorough and relevant differential diagnoses for each case study will be an integral part of this process. The case studies will be drawn from a broad variety of clinical disciplines. In addition, students will be required to work in small groups to develop their own "teaching case" and will lead the remainder of the class through a learning exercise based on the case they have created. (This course is restricted to students in PHYA-BS with at least 4th year standing.) **Lecture 8, Credits 4 (Spring)**

PHYA-530**Clinical Research Methods**

This course provides students with an overview of clinical epidemiological concepts from which infectious and non-infectious diseases manifest in acute and chronic settings. This course will also build on the knowledge of statistics and provide students with an introduction to research methodology and design. The course design will enable the PA student to read and interpret medical literature and evaluate the findings. The course will introduce different research methods and outcomes assessment of Evidence-Based Medicine (EBM). The course will require the physician assistant student to create a formal written graduate research proposal, which will culminate with a graduate project in the fifth year of the PA Program. Projects may be in the form of: clinical practice essay, PA curriculum development, medically-related community service project, in-depth medical case review, meta-analysis of specific disease/syndrome, or original medical research (This course is restricted to students in PHYA-BS with at least 4th year standing or those students with graduate standing in PHYA-MS.) **Lecture 2, Credits 2 (Spring)**

PHYA-550**Procedural Clinical Skills**

This course provides the PA student with the requisite skills for professional courses and internships. Emphasis is on developing competence in basic skills in conjunction with patient care. Current hepatitis B immunization status highly recommended. (This course is restricted to students in PHYA-BS with at least 4th year standing.) **Lecture 4, Credits 3 (Spring)**

PHYA-560**Healthcare Policy and Law**

This course will provide an overview of health care law, principles and ethics as it relates to the health care provider. Lecture topics will cover an introduction to law, criminal aspects of health care, patient consent issues, legal reporting obligations, contracts and antitrust, information management and health care records, HIPAA regulations, legal risk to the health care provider, patient safety and quality assurance, The Affordable Health Care Act, end of life issues, job negotiations and malpractice insurance issues. (This course is restricted to students in PHYA-BS with at least 4th year standing.) **Lecture 2, Credits 2 (Spring)**

Wegmans School of Health and Nutrition

Exercise Science

EXSC-101**Seminar in Exercise Science**

This course will provide first-year exercise science students with a strong foundation for a successful transition to university life. The course will introduce them to key personnel and resources essential for academic and personal achievement at RIT. Students will also develop a peer-based learning community with group projects centered on exercise science. (Prerequisites: This course is restricted to students in EXRSCI-BS.) **Lecture 1, Credits 1 (Fall)**

EXSC-150**Introduction to Exercise Science**

In this initial course of the Exercise Science undergraduate curriculum, students will be introduced to a broad array of topics within the field. Through an introductory review of body systems and physiological concepts students will gain an understanding and appreciation for the processes of response and adaptation which enhance and improve both health and fitness of people who exercise regularly. Career options will be reviewed and explored giving students an informed exposure to potential areas of future employment. (Prerequisites: BIOL-121 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

EXSC-205**Sports Physiology and Life Fitness**

This course goes inside the science of physical fitness providing the student with an in depth physiological understanding of how the body adapts and improves through exercise activity. Students actively perform a series of self-assessments which they must analyze in order to determine their current state of fitness. With this data students develop exercise programs tailored to their needs and interests. Stress management and nutrition are examined allowing students to incorporate these two important areas into their plans to be fit for life. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

EXSC-206**Fitness Prescription**

This course is designed to provide instruction to prepare students for certification as a Personal Trainer. It examines the role exercise plays in both the enhancement of health and fitness as well as the improvement of athletic performance. Students will develop a basic understanding of how the human body functions while physically active. Case studies are utilized to assist in the development of practical skills. (Prerequisites: (MEDG-101 and MEDG-103) or (MEDG-102 and MEDG-104) or BIOL-101 or BIOL-121 or (BIOL-123 and BIOL-125) or (BIOL-124 and BIOL-126) or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

EXSC-207 Exercise for Special Populations

This course is designed for those who are interested in the science of exercise and fitness for individuals with diagnosed disease states, or high performance requirements. The theoretical and diagnostic value of exercise testing will be reviewed. This information will then be used to create exercise prescriptions and understand the therapeutic benefit that exercise will have on specific conditions such as rheumatoid arthritis, diabetes, hypertension, heart disease, and obesity. High performance individuals functioning in challenging environments such as, astronauts, high altitude climbers, and ultramarathoners will also be considered. (Prerequisites: EXSC-205 or EXSC-206 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

EXSC-210 Human Motor Behavior

Human movement is complex and learning to move is an essential component of a lifetime of healthy activity. Exploring the nexus of learning and movement is the primary aim of this course. Using application-based activities students will develop the skills to recognize movement patterns, perform assessments, and correct inefficient movement. After successful completion students will be able to provide appropriate instruction leading to better movement mechanics, reduced risk of injury, and higher levels of athletic performance. (Prerequisites: MEDS-250 or equivalent courses.) **Lec/Lab 3, Credits 3 (Spring)**

EXSC-270 Group Exercise

Group exercise has progressed to include a wide variety of activities, equipment and environments. This course explores both the dynamics of group participation as well as techniques of instruction across a number of modalities including; hi/low impact, step training, kickboxing, sport conditioning, stationary indoor cycling, water exercise, yoga, and Pilates. Students will not only learn theory but will also design and teach classes to one another. Graduates of the class will be prepared to achieve certification in many of the modalities included in the course. (Prerequisites: (MEDG-101 and MEDG-103) or (MEDG-102 and MEDG-104) or BIOL-101 or BIOL-121 or (1026-211 and 1026-231) or (1026-212 and 1026-232) or (1026-213 and 1026-233) or 1001-201 or 1001-251 or equivalent course(s).) **Lecture 1.5, Credits 3 (Fall)**

EXSC-270 Group Exercise

Group exercise has progressed to include a wide variety of activities, equipment and environments. This course explores both the dynamics of group participation as well as techniques of instruction across a number of modalities including; hi/low impact, step training, kickboxing, sport conditioning, stationary indoor cycling, water exercise, yoga, and Pilates. Students will not only learn theory but will also design and teach classes to one another. Graduates of the class will be prepared to achieve certification in many of the modalities included in the course. (Prerequisites: (MEDG-101 and MEDG-103) or (MEDG-102 and MEDG-104) or BIOL-101 or BIOL-121 or (1026-211 and 1026-231) or (1026-212 and 1026-232) or (1026-213 and 1026-233) or 1001-201 or 1001-251 or equivalent course(s).) **Lab 1.5, Credits 3 (Fall)**

EXSC-280 Strength Training for Performance

Stronger athletes make better athletes no matter what the sport and this course teaches techniques of optimal training to enhance the muscular fitness of all manner of athletes. Physiological principles of strength development and basic musculoskeletal anatomy are reviewed and general program design is discussed. Utilizing case studies, students develop sport specific programs which will be presented to the class. Students will also produce strength training manuals outlining appropriate guidelines for improved performance. (Prerequisites: (MEDG-101 and MEDG-103) or (MEDG-102 and MEDG-104) or BIOL-101 or BIOL-121 or (BIOL-123 and BIOL-125) or (BIOL-124 and BIOL-126) or equivalent courses.) **Lec/Lab 3, Credits 3 (Fall)**

EXSC-320 Coaching Healthy Behavior

This course will teach students to encourage those with long standing lifestyle habits that contribute to their chronic illness to change is a very challenging proposition. It addresses this problem by incorporating psychological, sociological and counseling principles, along with coaching skills, into an intervention technique that emphasizes the positive and leads people to choose and adhere to a wellness lifestyle. Students will review case studies and meet with professionals in the field. (Prerequisites: (MEDG-101 and MEDG-103) or (MEDG-102 and MEDG-104) or BIOL-101 or BIOL-121 or (BIOL-123 and BIOL-125) or (BIOL-124 and BIOL-126) or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

EXSC-360 Worksite Health Promotion

A growing number of employers are recognizing the value of healthier, more physically fit employees and are providing health promotion programs through a variety of innovative means. This course will examine the theoretical basis for employee health programs as well review several case studies. Students will have the opportunity to visit and review local programs as well as design a model program to present to the class. (Prerequisites: (MEDG-101 and MEDG-103) or (MEDG-102 and MEDG-104) or BIOL-101 or BIOL-121 or (1026-211 and 1026-231) or (1026-212 and 1026-232) or (1026-213 and 1026-233) or 1001-201 or 1001-251 or equivalent course(s).) **Lecture 3, Credits 3 (Fall)**

EXSC-370 Senior Adult Fitness

Our nation's growing population of senior citizens presents both challenges and opportunities to our healthcare system. This class explores the opportunities and the processes of enhancing the physical fitness and functional capacity of aging adults. Principles of assessment, prescription and adherence are modified to meet the needs of senior citizens and students will examine several case studies. Students get to apply what they've learned by designing and conducting exercise sessions with actual participants. (Prerequisites: (MEDG-101 and MEDG-103) or (MEDG-102 and MEDG-104) or BIOL-101 or BIOL-121 or (1026-211 and 1026-231) or (1026-212 and 1026-232) or (1026-213 and 1026-233) or 1001-201 or 1001-251 or equivalent course(s).) **Lecture 3, Credits 3 (Fall)**

EXSC-380 Sports Psychology

"Keeping your head in the game" is one of the hallmarks of success for high performance athletes and this course explores the psychological aspects of achieving that capability. Through examining research based evidence of successful practices and techniques to produce, that winning edge, students will become versed in the process of coaching athletes to possess and function with athletic "mental toughness." (Prerequisites: (MEDG-101 and MEDG-103) or (MEDG-102 and MEDG-104) or BIOL-101 or BIOL-121 or (1026-211 and 1026-231) or (1026-212 and 1026-232) or (1026-213 and 1026-233) or 1001-201 or 1001-251 or equivalent course(s).) **Lecture 3, Credits 3 (Spring)**

EXSC-410 Kinesiology

As a study of human movement this course will cover topics that begin with a review of the functional anatomy of the musculoskeletal system including both the upper and lower extremity as well as the spinal column and thorax. Factors of linear and rotary motion are reviewed along with postural analysis and movement elements associated with pushing, pulling and throwing objects. There is no separate Lab for this class and laboratory experiences will be incorporated into specifically designated lecture times. At the conclusion of this course students will have a functional capability to assess the intricacies of human movement. (Prerequisites: MEDS-250 or equivalent courses.) **Lab 3, Credits 4 (Fall)**

EXSC-410 Kinesiology

As a study of human movement this course will cover topics that begin with a review of the functional anatomy of the musculoskeletal system including both the upper and lower extremity as well as the spinal column and thorax. Factors of linear and rotary motion are reviewed along with postural analysis and movement elements associated with pushing, pulling and throwing objects. There is no separate Lab for this class and laboratory experiences will be incorporated into specifically designated lecture times. At the conclusion of this course students will have a functional capability to assess the intricacies of human movement. (Prerequisites: MEDS-250 or equivalent courses.) **Lecture 3, Credits 4 (Fall)**

EXSC-420 Biomechanics

The study of mechanics as it pertains to living organisms is the basis of biomechanics. Principles of physics are applied to human motion with movements being analyzed for their relationship to statics and dynamics. Kinematics and kinetics are explored within the context of sports performance and functional human locomotion. (Prerequisite: EXSC-410 and PHYS-112 or equivalent courses.) **Lab 3, Credits 4 (Spring)**

EXSC-420 Biomechanics

The study of mechanics as it pertains to living organisms is the basis of biomechanics. Principles of physics are applied to human motion with movements being analyzed for their relationship to statics and dynamics. Kinematics and kinetics are explored within the context of sports performance and functional human locomotion. (Prerequisite: EXSC-410 and PHYS-112 or equivalent courses.) **Lecture 3, Credits 4 (Spring)**

EXSC-430 Theory of Athletic Injuries

Even the very best athletes experience injury and being able to recognize and respond to those conditions is a crucial skill for those who will work with athletes. Students will learn the signs and symptoms of injury and the process of first response as well as how to support athletes through rehab. Successful students will learn how to incorporate injury reduction techniques into the training programs they develop for the athletes they serve. (Prerequisites: (MEDG-101 and MEDG-103) or (MEDG-102 and MEDG-104) or BIOL-101 or BIOL-121 or (BIOL-123 and BIOL-125) or (BIOL-124 and BIOL-126) or equivalent courses.) **Lec/Lab 3, Credits 3 (Fall)**

EXSC-440 Cardiac Rehabilitation

Following a heart attack many people feel as though their health is lost, however those who participate in a cardiac rehabilitation program experience a much higher rate of recovery. Students will explore the physiological principles of rehabilitation through a thorough review of atherosclerosis and the process of adaptation by the cardiovascular system to proper exercise. Through the class, students will visit local cardiac rehab programs and design exercise prescriptions and educational programs for case studies. (Prerequisites: (MEDG-101 and MEDG-103) or (MEDG-102 and MEDG-104) or BIOL-101 or BIOL-121 or (1026-211 and 1026-231) or (1026-212 and 1026-232) or (1026-213 and 1026-233) or 1001-201 or 1001-251 or equivalent course(s).) **Lecture 3, Credits 3 (Spring)**

EXSC-480**Training High Performance Athletes**

Aerobic capacity, strength, flexibility, speed, power, agility, nutrition, and rest are all crucial to the success of athletes and for trainers the need to appropriately coordinate all these factors is a significant challenge. This course explores the interrelationship of the multifactorial principles of athletic performance. Using case studies, modeling, flow sheets and scheduling plans students develop techniques that will lead athletes to success in their training routines. (Prerequisites: (MEDG-101 and MEDG-103) or (MEDG-102 and MEDG-104) or BIOL-101 or BIOL-121 or (BIOL-123 and BIOL-125) or (BIOL-124 and BIOL-126) or equivalent courses.) **Lec/Lab 3, Credits 3 (Spring)**

EXSC-550**Exercise Physiology**

Exercise Physiology is the scientific basis for the field of exercise science. This course provides students with an opportunity to deepen their understanding of the body's responses and adaptations to exercise. Neuromuscular physiology is reviewed along with energy systems and mechanisms of fatigue. The cardiorespiratory system is examined with a focus on control and regulation during activity and there is a look at the physiological components of exercise training. Environmental factors that impact sport activities as well as training techniques which optimize performance will be reviewed. The differences in performance and adaptation that exist between children, adolescents, and adults as well as between males and females will be compared and contrasted. Exercises influence on long term health and fitness will conclude the course. Laboratory experiences will allow students to integrate and apply the concepts of exercise physiology through investigative experiments. (Prerequisites: (MEDS-250 and MEDS-251) or (1026-350 and 1026-360) or equivalent courses.) **Lab 3, Credits 4 (Fall)**

EXSC-550**Exercise Physiology**

Exercise Physiology is the scientific basis for the field of exercise science. This course provides students with an opportunity to deepen their understanding of the body's responses and adaptations to exercise. Neuromuscular physiology is reviewed along with energy systems and mechanisms of fatigue. The cardiorespiratory system is examined with a focus on control and regulation during activity and there is a look at the physiological components of exercise training. Environmental factors that impact sport activities as well as training techniques which optimize performance will be reviewed. The differences in performance and adaptation that exist between children, adolescents, and adults as well as between males and females will be compared and contrasted. Exercises influence on long term health and fitness will conclude the course. Laboratory experiences will allow students to integrate and apply the concepts of exercise physiology through investigative experiments. (Prerequisites: (MEDS-250 and MEDS-251) or (1026-350 and 1026-360) or equivalent courses.) **Lecture 3, Credits 4 (Fall)**

EXSC-587**Experiential Topics in Exercise Science**

Experiential Topics in Exercise Science engages learners to explore topics in exercise science that are either novel findings, of current concern, hold media interest, or require a unique presentation platform. Course content and delivery methods will vary for each course offering, but will include development of professional presentation skills, interpretation of evidence-based resources, and translation to future health and fitness practice. An experiential component will enable hands-on learning to assist with topic mastery and application. (Prerequisites: MEDS-251 or equivalent course.) **Lec/Lab 7, Credits 3 (Fall, Spring, Summer)**

EXSC-589**Topics in Exercise Science**

Topics in Exercise Science engages learners to explore topics in exercise science that are either novel findings, of current concern, hold media interest, or require a unique presentation platform. Course content and delivery methods will vary for each course offering, but will include development of professional presentation skills, interpretation of evidence-based resources, and translation to future health and fitness practice. (Prerequisites: MEDS-250 or MEDS-251 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

EXSC-590**Exercise Science Research**

This course is designed to give students an immersive and hands-on research experience related to exercise science and physical activity. Students will use knowledge from prerequisite coursework to hypothesize, design, and conduct a research investigation that focuses on some facet of exercise physiology and science. Areas of skill development include hypothesis generation, logistical and ethical considerations of research methods, institutional review board submission, data management, analysis and interpretation. This class will benefit those who desire an immersive hands-on exposure to conducting exercise science based research. Students in this course will be required to present at an undergraduate research venue, such as an undergraduate research symposium. (Prerequisites: EXSC-550 and NUTR-560 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

EXSC-599**Independent Study**

This course provides the opportunity for independent investigation, under faculty supervision, on a subject matter either not included in existing courses or further investigation of a topic of interest presented in another course. A student-driven, faculty-mentored proposal is drafted that describes the plan of work, deliverables expected, evaluation criteria, and possible credit load. **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**

Nutrition Management**NUTR-100****Nutr and Dietetics as a Health Profession**

This course is an introduction to the professional roles and responsibilities as a dietitian/nutritionist with emphasis on careers, professional development and conduct. Dietetics practice, including the scope of the practice, the role functions of registered dietitians, and the education requirements for entry into practice will be explored and contrasted with complementary aspects for nutritionists and nutrition educators not credentialed as registered dietitians. The history of the profession of nutrition and dietetics will serve as a background for dietetics practice in today's changing healthcare arena. Learning activities will consist of lecture, class discussion, assigned readings, and guest presentations by practicing Registered Dietitians and nutritionists. **Lecture 1, Credits 1 (Spring)**

NUTR-205**Complementary and Integrative Approaches for Well-being**

Complementary and alternative therapies for well-being are defined and described with information provided in the context of safety issues, efficacy, regulations, marketing, resource discrimination. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

NUTR-210**Nutrition and the Mediterranean Diet**

This course provides a study of the Mediterranean Diet and culture through a combination of course work at RIT during spring semester culminating in a 9 day trip to Croatia at the end of the semester. The focus of this course is on understanding the unique characteristics of the Mediterranean Diet and the effect of adhering to the diet on one's health. The course will compare the Mediterranean Diet to other ethnic cuisines and MyPlate food guide tools. The student will become familiar with foods typically consumed on the Mediterranean Diet and will demonstrate recipes using these foods and will develop a one week menu featuring the Mediterranean Diet including nutritional analysis. Principles of the Mediterranean Diet will be introduced via lecture and labs. A culminating experience will involve travel to Dubrovnik, Croatia and the surrounding area to see and experience first-hand the principles of the Mediterranean Diet. Lab fee as well as additional cost for study abroad component of the course required. **Lec/Lab 4, Credits 3 (Fall, Spring)**

NUTR-215**Foundations of Nutrition Sciences**

This is an introductory course in nutritional science concepts and application to current nutrition issues. This course covers the study of specific nutrients and their functions, the development of dietary standards and guides and how these standards are applied throughout the lifecycle. Students learn to analyze their own diets and develop strategies to make any necessary dietary changes for a lifetime of good health. Current health and nutrition problems and nutrition misinformation will be discussed. Online sections are asynchronous. Students are assessed by learning activities such as: weekly quizzes and discussion boards, homework assignments, and a final diet analysis project. In person sections are synchronous lectures and class discussions. Students are assessed by learning activities such as: exams, homework, assignments and final project analysis. **Lecture 3, Credits 3 (Fall, Spring)**

NUTR-223**Food and Beverage Management Lab**

This course will provide direct, practical experience for Dietetics & Nutrition students in quantity food development, production and service operations. Students will rotate through several positions within the RIT food service department and become exposed to the many activities that are required to run a large scale food operation. RIT's foodservice department will host Dietetics & Nutrition students for three hours each week as they are scheduled to work through various rotations in the department. This lab is taken in conjunction with the Food and Beverage Management course; HSPT-335. (Co-requisite: HSPT-335 or equivalent course.) **Lab 3, Credits 1 (Spring)**

NUTR-300**Sports Nutrition**

This course will provide an introduction to the integration between exercise and nutrition-related topics by exploring the intimate link among nutrition, energy metabolism, and human exercise response. The course content will sort fact from fiction and help students and practitioners obtain the knowledge they need to give sound advice to athletes and active individuals. (Prerequisite: College level science course preferred.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

NUTR-333**Techniques of Dietetics Education**

This course prepares Dietetics and Nutrition students to counsel and train clients and to give effective and persuasive presentations. Topics include communications methods, learner/audience analysis, basic learning theory, developing counseling and training materials, as well as designing, making, and evaluating individual and group presentations. As part of the course each student is required to design and give a presentation and to design a self-training module/lesson. (Prerequisites: NUTR-215 and CHMB-402 and MEDS-250 and MEDS-251 or equivalent courses and student standing in NUTR-BS, NUTRSC-BS or NUTRSC-MN program.) **Lecture 3, Credits 3 (Fall)**

NUTR-402

Dietetic Environment

Introductory supervised practice/practicum course. This course explores the profession of dietetics which includes current dietetics practice as well as practice trends and career options. Students interact with a representative sampling of personnel in all areas of food and nutrition. Students will become familiar with current Academy of Nutrition and Dietetics Scope of Practice Framework, Standards of Professional Performance, and the Code of Ethics in the profession of Dietetics. The development of an outcome based professional portfolio is required. (Prerequisites: NUTR-215 and 2 co-ops (NUTR-499) and CHMB-402 and MEDS-250 and MEDS-251 and MEDG-106 or equivalent courses.) **Lab 4, Credits 3 (Fall)**

NUTR-402

Dietetic Environment

Introductory supervised practice/practicum course. This course explores the profession of dietetics which includes current dietetics practice as well as practice trends and career options. Students interact with a representative sampling of personnel in all areas of food and nutrition. Students will become familiar with current Academy of Nutrition and Dietetics Scope of Practice Framework, Standards of Professional Performance, and the Code of Ethics in the profession of Dietetics. The development of an outcome based professional portfolio is required. (Prerequisites: NUTR-215 and 2 co-ops (NUTR-499) and CHMB-402 and MEDS-250 and MEDS-251 and MEDG-106 or equivalent courses.) **Lecture 2, Credits 3 (Fall)**

NUTR-497

Dietetic Internship Seminar

Provides the student applying to Dietetic Internships a process to make the task manageable. Students are provided timelines and assignments to step them through the application process which includes a personal statement/letter of application, resume, letters of reference, portfolio, site visits and interviews. The Internship application process is accomplished through the Dietetic Internship Centralized Application System (DICAS), and an independent centralized computer matching organization, D&D Digital (DND). (Co-requisite: NUTR-525 or equivalent course.) **Lecture 1, Credits 1 (Fall)**

NUTR-499

Cooperative Education Experience

Co-op is a work experience (typically full-time and paid) for at least 400 hours in an industry related to food, nutrition and/or healthcare, monitored by the Office of Cooperative Education and approved by the faculty in the Wegmans School of Health and Nutrition. Designed for students to gain essential career-related skills and experience. Dietetics and Nutrition students are required to complete three co-ops with at least one co-op in the healthcare environment and one in the food industry. Nutritional Sciences students are required to complete two co-ops. Students typically complete co-ops during the summer. Freshmen begin co-op the summer following their first year studies. Transfer students may be granted credit for one co-op based on education and work experience, as determined by the Program Director. **CO OP, Credits 0 (Fall, Spring, Summer)**

NUTR-510

Integrative Approaches to Health

This class offers students in the Nutrition Management major an overview of controversial and accepted alternative diet therapies, basic medicine guidelines, and vitamin/mineral supplementation. (Prerequisites: NUTR-215 and CHMB-402 and MEDS-250 and MEDS-251 or equivalent courses and student standing in NUTR-BS, NUTRSC-BS or NUTRSC-MN program.) **Lecture 3, Credits 1 (Fall)**

NUTR-525

Medical Nutrition Therapy I

This course is the first course of a two course series. Review and application of biological metabolism and interrelationships of nutrients, hormones, enzymes, and other biochemical substances in humans. Modification of nutritional intake to meet nutritional needs altered by diseases and stress as well as use of alternate methods of feeding (enteral/parenteral) to meet nutritional needs is discussed in depth. This course emphasizes the practical applications of medical nutritional therapy for use with patients/clients. (Prerequisites: NUTR-215 and CHMB-402 and MEDS-250 and MEDS-251 or equivalent courses and student standing in NUTR-BS, NUTRSC-BS or NUTRSC-MN program.) **Lecture 3, Credits 3 (Fall)**

NUTR-526

Medical Nutrition Therapy II

This course is a continuation of NUTR-525 Medical Nutrition Therapy I. Review and application of biological metabolism and interrelationships of nutrients, hormones, enzymes, and other biochemical substances in humans. Modification of nutritional intake to meet nutritional needs altered by diseases and stress as well as use of alternate methods of feeding (enteral/parenteral) to meet nutritional needs is discussed in depth. This course emphasizes the practical applications of medical nutritional therapy for use with patients/clients. (Prerequisites: NUTR-525 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

NUTR-550

Community Nutrition

Study of current nutrition issues and delivery of food and nutrition services in the community. The course is designed to allow senior level students to acquire skills necessary to deliver services in the public health and private sector markets. Individual practicum in community facility is required and arranged by the instructor. All students will also participate in industry related research to identify innovative and effective delivery strategies for nutrition services and will have the opportunity to accomplish peer dissemination of their previously completed individual research project at an industry conference. (Prerequisites: NUTR-525 or equivalent course.) **Lab 4, Credits 3 (Spring)**

NUTR-550

Community Nutrition

Study of current nutrition issues and delivery of food and nutrition services in the community. The course is designed to allow senior level students to acquire skills necessary to deliver services in the public health and private sector markets. Individual practicum in community facility is required and arranged by the instructor. All students will also participate in industry related research to identify innovative and effective delivery strategies for nutrition services and will have the opportunity to accomplish peer dissemination of their previously completed individual research project at an industry conference. (Prerequisites: NUTR-525 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

NUTR-554

Life Cycle Nutrition

An applied course for the Nutrition Management major regarding the nutritional needs throughout the life cycle. Emphasis is given to nutrition during pregnancy, infancy, early childhood, adolescence, young and middle adulthood, and the elderly. Practicum in facilities delivering nutrition services to these age groups is required. Practicum hours by arrangement. (Prerequisites: NUTR-215 and CHMB-402 and MEDS-250 and MEDS-251 or equivalent courses and student standing in NUTR-BS, NUTRSC-BS or NUTRSC-MN program.) **Lab 4, Credits 4 (Spring)**

NUTR-554

Life Cycle Nutrition

An applied course for the Nutrition Management major regarding the nutritional needs throughout the life cycle. Emphasis is given to nutrition during pregnancy, infancy, early childhood, adolescence, young and middle adulthood, and the elderly. Practicum in facilities delivering nutrition services to these age groups is required. Practicum hours by arrangement. (Prerequisites: NUTR-215 and CHMB-402 and MEDS-250 and MEDS-251 or equivalent courses and student standing in NUTR-BS, NUTRSC-BS or NUTRSC-MN program.) **Lecture 3, Credits 4 (Spring)**

NUTR-555

Nutrition Throughout the Lifecycle

This course emphasizes the interrelationships of social, psychological, physiological, and biochemical factors and their impact on nutrient requirements and recommendations for food intake during specific stages of the life cycle. Emphasis is given to nutrition during pregnancy, infancy, early childhood, adolescence, young and middle adulthood, and the elderly. (Prerequisites: NUTR-215 and CHMB-402 and MEDS-250 and MEDS-251 or equivalent courses and student standing in NUTRSC-BS or NUTRSC-MN.) **Lecture 3, Credits 3 (Spring)**

NUTR-560

Health and Nutrition Research Foundations

This course offers students the opportunity to learn basic research principles and integrate with skills and knowledge from other courses to conduct research in an area of professional interest. The research project includes gathering primary data, assessing and summarizing the data, and sense-making or drawing conclusions from the data. Students will complete activities to gain skills in project management, secondary research development, and Human Subject Research (HSRO) submission and meet RIT's Writing-Intensive-Program requirement. (Prerequisites: STAT-145 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

NUTR-580

Global Food and Nutrition Perspectives

This course provides an overview of global food and nutrition concepts and issues from both developed and developing country perspectives. Topics include breastfeeding, macronutrients and micronutrient problems, food security and access, food emergencies, maternal and child health and the impacts of socio-economic disparities on nutrition status. Also addressed are challenges in food and nutrition policy development, program design and implementation that are unique to global efforts and sustainable development goals (SDGs). Students apply course content and analytical thinking skills to a unique self-selected country and develop dissemination skills by informing others of the unique food, nutrition and health issues. (Prerequisites: NUTR-215 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

NUTR-587

Experiential Topics in Nutritional Sciences

Experiential Topics in Nutritional Sciences engages learners to explore topics in nutritional science that are either novel findings, of current concern, hold media interest, or require a unique presentation platform. Course content and delivery method will vary for each course offering, but will include development of professional presentation skills, interpretation of evidence-based resources, and translation to future health and nutrition practice. A laboratory component will enable experiential, hands-on learning to assist with topic mastery and application. (Prerequisites: NUTR-215 or equivalent course.) **Lec/Lab 7, Credits 3 (Fall, Spring, Summer)**

NUTR-589

Topics in Nutritional Sciences

Topics in Nutritional Sciences engages learners to explore topics in nutritional science that are either novel findings, of current concern, hold media interest, or require a unique presentation platform. Course content and delivery method will vary for each course offering, but will include development of professional presentation skills, interpretation of evidence-based resources, and translation to future health and nutrition practice. (Prerequisites: NUTR-215 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

NUTR-599

Independent Study

This course provides the opportunity for independent investigation, under faculty supervision, on a subject matter either not included in existing courses or further investigation of a topic of interest presented in another course. A student-driven, faculty-mentored proposal is drafted that describes the plan of work, deliverables expected, evaluation criteria, and possible credit load. **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**

College of Liberal Arts

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Course numbering: RIT courses are generally referred to by their alphanumeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100-299), upper division (300-599), or graduate level (600 and above).

Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.

Anthropology

ANTH-102

Cultural Anthropology

Human beings across the globe live and work according to different values and beliefs. Students will develop the tools for acquiring knowledge, awareness, and appreciation of cultural differences, and in turn enhance their abilities to interact across cultures. The course accomplishes these aims by examining the relationship between individuals and their communities, and the dynamics of ritual, religious, political, and social life in different parts of the world. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

ANTH-102H

Honors Cultural Anthropology

Anthropology is the holistic science of the human condition, and professional anthropologists engage in experiential, empirical and humanistic research. Cultural diversity and change are explored through the anthropological techniques of immersion (ethnographic fieldwork) and cross-cultural analysis. In-depth and comparative analysis of critical issues may include transnational migration, ethnic nationalism, racism, changing and clashing views on gender and sexuality, indigenous peoples' rights, religious fundamentalism, genocide, war, hunger, famine, and cultural and economic dimensions of globalization. The specific topic varies from year to year. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

ANTH-103

Archaeology and the Human Past

Archaeology is the study of the human past, from the origin of our species through to the development of modern, industrial states by means of the physical remains of past human behavior. In studying the past, archaeology seeks to explain how we, modern humans, came to be. This course investigates how archaeologists study the past, explains how human society has changed over time, and presents an overview of world prehistory. Specific topics include the evolution of modern humans, the peopling of the world, the development of agriculture, the rise of state-level societies, and associated social and material technologies such as writing and urbanism. Case studies will be used throughout to demonstrate how archaeological research is conducted and how archaeologists use their research to formulate explanations of the past that have relevance for the present. **Lecture 3, Credits 3 (Fall, Spring)**

ANTH-104

Language and Linguistics

Language has a crucial role in our lives as a functional system of human communication. Language is central to our cultures and societies. This course provides an introduction to the field of linguistics. It considers both how language is described and analyzed by linguists and how evidence from language can shed light on a variety of social, cultural, and cognitive phenomena. The course provides an orientation both to human language and the field of linguistics. It introduces the languages of the world, how languages have been described, the diversity in language structure, the issue of language endangerment and death, and the efforts to document and preserve the world's languages, among other topics. **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-151

Honors First Year Seminar: Exploring Food, Drink, and Place

This course introduces students to the relations between food, drink, and place. Food production, circulation, and consumption will be examined critically through examining their local and global import and the assumptions that inform different food systems. Alternatives to industrialized food will be explored through both organic foods and the slow food revolution. Other themes to be examined will be food and identity, social class, and gender in particular. Students will have the opportunity to sample diverse cuisines and to discuss their relation to both place and culture. Field trips will be taken to the Rochester Public Market and to various Rochester urban gardens. **Lecture 3, Credits 3 (Fall)**

ANTH-200

On the Cutting Edge: Research and Theory in the 21st Century

Research is the primary pathway to theory formation in the social sciences. This course focuses on how ideas about social life emerge through research in sociology and anthropology. This course is designed as a seminar, in which students discover how scholars in these disciplines formulate research questions in relationship to theory and issues of public concern. (Prerequisites: Successful completion of one course in Anthropology (ANTH), Sociology (SOCI) or International and Global Studies (INGS) is required.) **Lec/Lab 3, Credits 3 (Spring)**

ANTH-201

The Ethnographic Imagination

This course explores the politics and poetics of writing about society and culture. Writing is a form of power, in that our representations of people influence the way that others think about and act toward them. The way that social researchers write is therefore shot through with ethical implications and weighty decisions. Critical issues include whether people are objectified, cast as wholly Other, culture-bound or creative, out of the past or coeval, racialized or of a common humanity, problematic or multifaceted, passive or agentive, mystified or perceptive, and mechanical or extraordinary. Writing about society and culture is also poetic. We can convey something of people's life experiences, thoughts, agency, and the constraints within which they lead their lives. How well we do so depends upon our ethical reflexivity and attention to the poetics of language. In this course, we will consider these ethical questions, read experimental texts, and discuss how writing style implicitly conveys social theory. (Prerequisites: Successful completion of one course in Anthropology (ANTH), Sociology (SOCI) or International and Global Studies (INGS) is required.) **Lecture 3, Credits 3 (Fall)**

ANTH-210

Culture and Globalization

By exploring critical issues of globalizing culture, we examine how ideas, attitudes, and values are exchanged or transmitted across conventional borders. How has the production, articulation, and dissemination of cultural forms (images, languages, practices, beliefs) been shaped by global capitalism, media industries, communication technologies, migration, and tourist travels? How are cultural imaginaries forged, exchanged, and circulated among a global consumer public? How has the internationalizing of news, computer technologies, video-sharing websites, blogging sites, and other permutations of instant messaging served to accelerate cultural globalization? Students will be introduced to anthropological perspectives on cultural globalization, the transmission of culture globally, and the subsequent effects on social worlds, peoples, communities, and nations. **Lecture 3, Credits 3 (Fa/sp/su)**

ANTH-215**Field Methods in Archaeology**

This course introduces students to the methods of archaeological fieldwork. The course begins with the student's development of a research question and design. We then explore the feasibility of this research through the examination of sampling techniques, site survey, and excavation. Field methods of recording, photography, and artifact conservation will also be discussed. Students will be able to analyze the usefulness of the field techniques in light of the archaeological scientific methods for dating, and organic and inorganic analyses. Students should emerge from the course understanding the values of the techniques necessary for proper archaeological excavation towards the reconstruction of the past and the development of an understanding of our present. **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-215**Field Methods in Archaeology**

This course introduces students to the methods of archaeological fieldwork. The course begins with the student's development of a research question and design. We then explore the feasibility of this research through the examination of sampling techniques, site survey, and excavation. Field methods of recording, photography, and artifact conservation will also be discussed. Students will be able to analyze the usefulness of the field techniques in light of the archaeological scientific methods for dating, and organic and inorganic analyses. Students should emerge from the course understanding the values of the techniques necessary for proper archaeological excavation towards the reconstruction of the past and the development of an understanding of our present. **Lab, Credits 3 (Fall or Spring)**

ANTH-220**Language and Culture: Introduction to Linguistic Anthropology**

Language is a core element of culture, both as a repository of meaning, and also because it is the primary means through which humans carry out social relationships, share ideas, and contest received understandings. Linguistic anthropology investigates this interplay between language and culture. Topics will vary by semester, and may include metaphor and narrative; language acquisition in relationship to childhood socialization; language, thought, and world-view; language and identity; multilingualism; the social contexts of language change; literacy; and the politics of language use and language ideologies. **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-225**Globalizing Africa**

This course introduces students to processes of interconnection, local, regional, national, and global, that have altered and continue to impact life in Africa, taking into account the enormous impact of Africans on one another and on those of us living outside of the continent. In the course, we will focus on how past, present, and anticipated future events in African movements of people, ideas, and things, across time and space effect the reception of new events. We will pay particularly close attention to how the relationships of time and space are formulated and understood by Africans in the present. While the historical past is never completed, but continuous in the present, its diverse contours lead to differently remembered, embodied, and enacted expressions. We will evaluate these diverse expressions in pre-colonial, colonial, and neo-colonial encounters as they have changed ideas of self and other, political philosophies and political economic systems, genders and sexualities, generational relations, religions, expressive arts, violence, and health on the African continent and around the globe. **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-230**Buried Treasure: Archaeology in Popular Culture**

People have been interested in their ancestors and the lives of past people likely for as long as we have been human. But this interest has rarely been disinterested. People have exploited, destroyed, or ignored the remains of previous societies. And how the past is understood has profound effects that ripple through all of society, at different times influencing group identity, political philosophy, art, architecture, literature, and film. The emergence of scientific archaeology in the last 150 years has created its own cultural references, including Indiana Jones and Lara Croft. Each semester this course is offered, a specific topic will examine the cultural context in which archaeologists do their work, what is made of their efforts, and how these are related to larger issues in society. **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-235**Immigration to the U.S.**

This course examines immigration to the U.S. within the context of globalization. We examine the push- and pull-factors that generate immigration, and changing immigration policies and debates. We consider how changes in the American workplace have stimulated the demand for foreign workers in a wide range of occupations, from software engineer to migrant farmworker and nanny. We review the cultural and emotional challenges of adapting within the American cultural landscape, transnationalism and connections with the homeland, the experiences of refugees, and how immigration has changed since 9/11. Special attention is given to immigration from Latin America, the largest sending region. **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-244**Human Centered Design Queries: An Anthropological Approach**

How do we imagine the people that we design for? How do social differences around race, gender and class impact how we design for others? How is design a cultural process? How can ethnography make for better design? This course introduces the fundamentals of the field of design anthropology. The course explores how designers—from industrial designers, game designers to biomedical engineers—can use research-based practices to design better, reflecting the RIT mission to “leverage the power of technology, the arts, and design for the greater good.” We will begin by orienting ourselves to design thinking, exploring key conceptual frameworks from feminist scholarship, science and technology studies, (dis)ability studies and approaches to the social aspects of technical thinking. We will then explore different design domains, including urban planning, furniture design, access technology, and user experience design. Throughout the term we will learn about how ethnographic methods can create human-centered design by starting with lived experiences, exploring power relations and ultimately learning about the perspectives of those whom we design for. **Lecture 3, Credits 3 (Fall, Spring)**

ANTH-245**Ritual and Performance**

The world's cultural diversity is most vividly and dynamically displayed through ritual and festival. Ritual is anything but superfluous; rather, some of the most important work of culture is accomplished through the performance of ritual. Through cross-cultural comparison, by way of readings and films, we explore the following dimensions of ritual: symbols, embodiment, emotion, discipline, contestation of tradition and authenticity, and the orchestration of birth, childhood socialization, gender, maturation, marriage, community, hierarchy, world renewal, and death. Written expression is enhanced through drafting, revision, and peer review. **Lecture 3, Credits 3 (Fa/sp/su)**

ANTH-246**Gender and Health**

This course examines connections between gender and health that are both conceptual and empirical. Students will explore the causes of gender-based differences in health outcomes through case studies of sexual and reproductive rights, HIV/AIDS epidemics and violence. Students will also examine global gender and health trends. The course concludes with an examination of gender inequity in health care and policy implications of these inequities. **Lecture 3, Credits 3 (Annual)**

ANTH-250**Themes in Archaeological Research**

One of the most fascinating dimensions of archaeology is the discovery that people have done essentially the same things in different places and different times, independently of developments elsewhere. Agriculture, writing, urbanism, complex economies, and so on, all have been independently invented multiple times in different parts of the world. This fact raises some intriguing questions about what it means to be human. By comparing how these developments occurred in different places and times, archaeologists can, in a sense, perform experiments on the past. Each semester this course is offered we will focus on a separate theme in archaeological research, such as the transition to agriculture; production, trade, and exchange; the origin of writing; imperialism, colonialism, and warfare; pseudoscience/pseudoarchaeology; or human evolution. We will study competing theoretical perspectives and different world regions to gain a broad understanding of the theme and how both theory and data are used to create a comprehensive understanding of the human past. **Lecture 3, Credits 3 (Fall, Spring)**

ANTH-255**Regional Archaeology**

Since the first humans set out from Africa nearly two million years ago, our ancestors and relatives managed to settle in almost every continent. Wherever they went, they left traces of their lives that are tens of thousands to hundreds of thousands of years deep. We call these traces the archaeological record. Almost everywhere our ancestors settled, they did many of the same things, such as inventing agriculture, cities, writing, and state-level societies. However, they did this in ways unique to each region and time. This course examines the archaeology of a specific region, such as the Middle East, Mesoamerica, North America, or East Asia, in detail. We examine the geography, culture, archaeological record, and significance of the region to various key themes in archaeological research with respect to other world regions. **Lecture 3, Credits 3 (Fall, Spring)**

ANTH-260**Native North Americans**

This course examines the persistence and change in Native American cultures using archaeological, ethnohistorical, socioeconomic, ethnographic, linguistic, and autobiographical sources among others. In addition to broad regional and historical coverage, we will read about and discuss culture change, colonialism, federal law, gender, race, and places in Native American contexts. Our goal is to understand the lived experiences of Indian people and the many forces that shape Native American lives. **Lecture 3, Credits 3 (Fa/sp/su)**

ANTH-265**Native Americans in Film**

This course will examine the parallels of anthropological works and resulting government policies in the late-19th and 20th centuries as they relate to the genre of Native Americans film, both popular and ethnographic works. In addition, an extensive regional and historical literature review will complement the possible films. **Lecture 3, Credits 3 (Fa/sp/su)**

ANTH-270

Cuisine, Culture and Power

Physically, culturally, and socially, humans live through food and drink. Spanning the globe, as nearly limitless omnivores, humans have developed myriad ways of collecting and cultivating food and taking advantage of local environments. We also put food to work for us socially by creating cuisine. Through cuisine, we forge and nourish relationships, commune with deities, and through luxury choices, demonstrate our "taste" and lay claim to elite status. Through the cultural practices of production and consumption of food and drink, we wield power. Food and drink consumption patterns have sustained slavery, poverty, malnutrition, and illegal immigration, and have laid waste to the environment. In this class, we explore physical, cultural, social, political, and economic dimensions of food and become more aware of how the private, intimate act of a bite connects us to the rest of humanity. **Lecture 3, Credits 3 (Fa/sp/su)**

ANTH-275

Global Islam

This course examines the spread of Islam beyond its origins in the Middle East, and the cultural and social clashes, but also the mutual adjustments that have followed. This course explores core tenets of Islam, but also how its practices and beliefs are altered as practitioners in different countries alternately adopt, co-opt, massage, react to, and reject elements in accordance with the meaningful social, cultural, and political lives they build for themselves. The compatibility of Islam with Western society is often debated in contemporary public discourse. This debate is typically marked by an assumption that Islamic beliefs clash with Western secular democratic ideals, an assumption which results in tensions over mosque building, headscarves, and other public signs of Islamic faith. We will explore the diverse ways of being Muslim from a cross-cultural perspective and the sometimes-challenging negotiation of fulfilling these religious tenets while living in Muslim-minority places. **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-285

American Indian Languages

With a focus on the indigenous languages of the Americas, we explore language contact among peoples, study various writing systems, and the sociolinguistic and cultural contexts in which these languages are spoken. Students learn how indigenous languages have been studied and classified. In addition to providing an overview of the languages' structural and typological attributes, we will also discover their histories as well as present-day challenges. **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-295

Global Public Health

Global health is a term that reflects a complex series of problems, policies, institutions and aspirations that have only recently made their way to the global stage. From its earliest days, global health was guided by principles in public health that situate the nation-state as responsible for the health of its population. While international health and tropical medicine, the precursors to global health, was driven by the distinction between wealthy and poor nations, global health today, as this course explores, is oriented to the unequal burden of disease around the world. The course will consider major global health challenges, programs, and policies through an integrated social science lens. After placing global health in historical context, we will focus on how the science of disease cannot be dissociated from the social context and policies that both drive the emergence of disease(s) and respond to the unequal burden of disease around the world. We will analyze current and emerging global health priorities, including emerging infectious diseases, poverty, conflicts and emergencies, health inequity, health systems reforms, and major global initiatives for disease prevention and health promotion. **Lecture 3, Credits 3 (Annual)**

ANTH-301

Social and Cultural Theory

This course explores influential classical and contemporary theories regarding society and culture. Students will assess the utility of different theories in addressing key enduring questions regarding human behavior, the organization of society, the nature of culture, the relationship between the individual and society, social control and social conflict, social groups and social hierarchy, the operation of power, cultural and social change, and the interplay between the global and the local. Theories will be marshaled to shed light on contemporary social and cultural phenomena and problems such as crime, violence, exploitation, modernity, and globalization. (Prerequisites: Successful completion of one course in Anthropology (ANTH), Sociology (SOC) or International and Global Studies (INGS) is required.) **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-302

Qualitative Research

Learning about social and cultural groups is a complex and ethically sensitive process. We explore common qualitative research methods for social and cultural research. We evaluate the utility of such methods for different purposes and contexts, including cross-cultural contexts. We consider common ethical dilemmas in research with human subjects, the ethical responsibilities of researchers, and common techniques for minimizing risks to subjects. (Prerequisites: Successful completion of one course in Anthropology (ANTH), Sociology (SOC) or International and Global Studies (INGS) is required.) **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-303

Statistics in the Social Sciences

The research conducted by sociologists and anthropologists generates large, complex data sets that are difficult to interpret subjectively. We will explore the basic quantitative tools that sociologists and anthropologists can use to understand these data sets and learn how to craft a research question and research design that utilize quantitative data, how to select appropriate quantitative techniques and apply them, how to present results, and how to critically evaluate quantitatively based knowledge claims. **Lecture 2, Credits 3 (Fall or Spring)**

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ANTH-305

Comparative and Historical Linguistics

All languages change through time, but how do they change? Where do these changes come from? In exploring traditional and contemporary approaches to historical linguistics, the study of language change, we compare different languages, different dialects of the same language, or different historical stages of a particular language, and investigate the history of languages and also language groups (or families). We investigate hypotheses about the grammar, vocabulary, and pronunciation of languages long dead, and we explore how languages can give us insights to understanding human prehistory. **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-310

African Film

This course considers the diversity, contours and synergies of African films and filmmaking, traversing the continent to view films from Senegal, the Democratic Republic of Congo, Nigeria, South Africa, Zambia, Kenya, Egypt and Mali. Though much scholarship has focused on influential African filmmakers and nationally located cinemas, the straight-to-video systems of the 1980s and 1990s had a profound impact on African films and filmmaking. Nollywood and other video film industries began to dominate film production and transnational mobility, influencing new film technologies and industries, accessibility and addressability across the globe. Topics in this course include the influence of African film directors on filmmaking, and critical developments in major industries; Nollywood and beyond, and the cultural aesthetics, politics and economics that affect their global mobility and popular appeal; postcolonial identities and power; music and oral traditions of storytelling; didactic, post-colonial cinema with moral, political missions vs. 'arthouse' approaches; Afrofuturist and speculative cinema; channels such as African Magic that are shown in more than 50 African countries; and the effects of video streaming on global stardom and popularity. Students will learn about diverse African films and approaches to filmmaking, and the vibrant people and creative cultures that make up these film industries. **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-312

People Before Cities

More than half the global population today lives in densely populated urban areas, which are further surrounded by complex networks of smaller communities. Yet, the earliest cities appeared less than 6,000 years ago, a small fraction of time since our species' first appearance. The characteristics that define us as human were forged in radically different social universes from those of today. We lived our lives among not much more than 20-30 other people at any one time, hunting and gathering our food, and occasionally moving from place to place. This lifestyle was so successful and adaptable it endured pressures from more complex societies well into the 20th century. Understanding what life was like in such these small-scale societies is important because the material and social world in which they lived is the foundation for societies where food production, social hierarchy, and occupational specialization are the norm. This course will examine both the ethnographic and archaeological record of hunter/foragers from around the globe in an attempt to understand how it proved to be such a versatile and resilient way of life and how its successes, in fact, laid the foundation for social inequality, complexity, and food production. **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-315

The Archaeology of Cities

The long course of the human existence has been marked by a series of revolutions that have profoundly changed society and that ultimately produced the world we live in today. One of the key revolutions that made our world possible was the invention of urbanism. Cities first appeared in Mesopotamia about 6,000 years ago and since then have been independently invented in many different parts of the world. This course focuses on the prehistorical trajectories of urban development in different world regions, the multiple roles of cities, and their impact on the development of complex societies. We attempt to understand and explain how the city has developed and contributed to the constitution of modern society. Throughout the course we will work on developing a working definition of the city that encompasses urbanism in all its many forms. **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-320**Practicing Anthropology**

Practicing anthropologists use the methods, knowledge, and perspectives of anthropology to help address social problems and to enhance people's sense of well-being. Practicing anthropologists often work for government or not-for-profit agencies on projects that are sensitive to and respectful of cultural differences, oriented to agendas ideally set by community members themselves. Other practicing anthropologists may work for companies, helping them to manage equitable workplaces and design culturally appropriate communications, services, and products. Practicing anthropologists work in a wide variety of areas, including agricultural development, public health, parks and museums, tourism, libraries and archives, education, refugee resettlement, multicultural programming, community outreach and engagement, inclusion of marginalized populations such as seniors and those with disabilities, cultural resource management, conflict resolution, and advocacy. As global communication and transportation networks bring people of different cultural backgrounds together at an unprecedented pace, anthropologists can bridge worlds and foster mutual understanding, peaceable interactions, and projects of mutual benefit. Older applied anthropology projects were criticized as colonialist impositions of values and ways of life. Consequently, this course examines the ethical pitfalls of practicing anthropology and students will assess strategies that safeguard people's dignity, privacy, and rights, including the right to self-determination. (Prerequisites: Successful completion of one course in Anthropology (ANTH), Sociology (SOCL) or International and Global Studies (INGS) is required.) **Lecture 3, Credits 3 (Spring)**

ANTH-325**Bodies and Culture**

Our bodies are more than mere physical entities; they are conditioned by culture, society, and history. We will take a comparative approach to the cultural construction of bodies and the impact of ethnic, gender, and racial ideologies on body practices (i.e. surgical alteration, mutilation, beautification, surrogacy, erotica). We will critically investigate the global formation of normative discourses of the body (regarding sexuality, AIDS/illness, reproduction, fat/food) in medical science, consumer culture, and the mass media. The course features discussion, writing, and project-oriented research, encouraging students to acquire a range of analytic skills through a combination of text interpretation and research. **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-328**Heritage and Tourism**

Tourism is a global industry and an important part of the human experience. There are many forces within tourism that act upon people's lives, and in particular their environments, economies, cultural heritage, and identity. This course will explore tourism and its many dimensions. Beginning with an examination of kinds of tourism, this course unpacks tourism's ancient trade and pilgrimage roots as well as its class dynamics of post-industrialization. Other aspects of tourism to be explored include strategies and effects of tourism development and production, nationalism and cultural identity, commoditization and marketing of culture and the ethics of development, labor and infrastructural changes, social inequalities, ecological impact, sustainable tourism, the experience of tourists, ritual and authenticity, and the relationship between tourists and tourism workers. This course provides opportunities for cross-cultural analysis of tourism sites, for participant-observation of the tourist experience, and for evaluation and recommendation of tourism site development in and around Rochester. **Lecture 3, Credits 3 (Fall, Spring)**

ANTH-330**Cultural Images of War and Terror**

This course critically examines the visual culture of war and terror in a global world from an anthropological perspective. Representations of violence are endlessly transmitted on television, on the internet, in print media, in cinema, and in recreational games to become part of our everyday visual culture. Whether disseminated as news, documentary truth, or entertainment, the ubiquitous encounters with images of violence require a new form of visual literacy that not only highlights the intersection of the local and the global, but also recognizes the ways in which visual technologies, cultural politics of memory and history, media practices, and national ideologies intervene in the formation of a visual culture of war and terror. **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-335**Culture and Politics in Latin America**

What does it mean to be a region forged and defined by conquest? "Latin America" is a construct—a term referring to a vast region of the western hemisphere colonized by speakers of Latin-derived languages (including Spanish, Portuguese, and French). In this context, culture is political and politics are cultural. Throughout what is now called Latin America and the Caribbean, the cultural practices of Indigenous and African peoples became the justification for the imposition of European rule, territorial expansion, enslavement, the extraction of labor and natural resources, Christian evangelization, and the racialized legal frameworks that facilitated it all. This course traces these historical processes and examines present-day legacies of colonialism, including ethnic inequalities, colorism, economic vulnerability, patriarchal relations, and social unrest. We consider, as well, the agency of people of Indigenous and African descent as they pursued survival with tactics ranging from acquiescence and strategic passing to creative blending to outright defiance, resistance, and rebellion. Throughout, we look at how art, music, dance, literature, and religion have engaged critically with the forces of fascism, revolution, socialism, dictatorship, neo-imperialism, and globalization. **Lecture 3, Credits 3 (Spring)**

ANTH-341**Global Addictions**

This course evaluates global forms of "addiction" in medical, cultural, national, and transnational situations of encounter. Though primarily a EuroAmerican concept of illness, addiction is now discursively and experientially widespread, assuming the status of a "global form." Addiction narratives and experiences shape people and social life everywhere, as scientific and cultural or national knowledge intersect to form subjectivities, identities of addicts, and communities of addicted bodies. Concepts of will, morality, the addicted self and other, and living and dying also impact the cultural, national and international infrastructures we build—whether and how, for instance, we put resources into medical or criminal justice systems and networks. A closer look at the intimate lives of addicts thus enables us to consider identity boundaries and crossings; addiction languages; family relations and parenting; self-made communities and social bonds; work at the economic fringes of society; personal and institutional violence; policing and navigating enforcement or incarceration; homelessness and legal, medical and social service bureaucracies; as well as transnational production, trafficking, forms of addiction, and policing. By the end of the course, students will comprehend concepts and theories of addiction, and global perspectives on people living with addiction. **Lecture 3, Credits 3 (Fall, Spring)**

ANTH-345**Genocide and Transitional Justice**

The destruction and survival of societies hinges on collective ideas of identity. In times of social stress, identities—whether racial, ethnic, religious or national—become critical "sites" of conflict over the sovereignty of nation-states, and the legitimacy of social, cultural practices. When ideas fail to incorporate people, essentialist categories of identity, historical grievances, and accounts of extreme violence become interrelated, potent sources of destruction. Slavery and exclusive ownership of resources leave people starving or living in perilously polluted environments. Global cultural economies threaten local systems and self-representation. In this course, we will take critical, anthropological approaches to studies of ethnocide, genocide and transitional justice. Students will assess the destruction and survival of societies, from the 19th century slaughter of Native Americans and Amazonian Indians to more recent genocides in Cambodia, Bosnia, Rwanda, the Sudan, Iraq, Myanmar, Bangladesh and China. Students will consider similarities and differences in the social experiences of mass violence, and the ethics of protecting particular identity-based groups, and not others, in international, national and local laws. Students will become familiar with multiple inter-related justice systems, for instance, the International Criminal Court, national and United Nations-backed tribunals, and local justice systems such as the Rwandan Gacaca courts. Recent developments in legal ethics and international law will enable students to see how public sentiments, legal advocacy and other social, political processes facilitate enhanced protections for the world's most vulnerable people. **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-360**Humans and Their Environment**

Humans and their societies have always been shaped by their environment, but as human societies became more complex, their relationship with their environment changed from one of simple adaptation to one in which they had the power to change their environment. Often, the changes they have wrought have had unintended consequences, forcing societies to adapt to the changes that they themselves have brought about. Although we tend to think that this is a relatively recent phenomenon, humans have been altering their environment since the first human societies made the transition to agriculture over ten thousand years ago, if not longer. In this class, we will use the tools of environmental archaeology to explore the history of human interactions with their environments and to draw lessons on how we could manage that interaction today. **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-361**Sociology of Numbers**

Much of the knowledge of our social worlds has been digitized. This course explores how social technologies shape our relationships, personal lives, and sense of self. The metric manufacture of diversity has produced new forms of population management and inequality. Our biographic histories as citizens, consumers, workers/professionals, parents, lovers, and social media users are collected as data-bites and assessed in metric terms, thereby forging new sets of identities. The transformation of people into numerical entities is an act of statistical objectification. This process frames the creation of social and racial typologies, and is well demonstrated by the US census. Students will investigate the formation of racial, ethnic, and gender identities in the context of the accelerated desire to digitize humanity. **Lecture 3, Credits 3 (Annual)**

ANTH-365**Culture and Politics in the Middle East**

With a focus on everyday life in families, communities, and nations, we examine the diverse cultures and peoples of the Middle East in the context of political and economic forces that have shaped their lives in the past and present. We examine European colonialism and its modern-day legacies, including ethnic inequalities, economic vulnerability, labor migration, urbanism, and social unrest. We look at how art, music, oral traditions, and literatures have engaged critically with the forces of political change and neo-colonialism. We consider political activism, religious diversity, changing experiences and expectations of women and men, rebellion, revolution, and war, and the impacts of and creative responses to globalization. The cultural, political, social, and religious dynamics of Middle Eastern peoples will be discussed from a humanistic perspective. **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-370

Media and Globalization

The cultural importance of mass media has undergone tremendous growth in the context of globalization. Analysis of the global flows of media images across national borders emphasizes the cultural, social, and political impact of global media culture on communities in different parts of the world. How, for example, do mass media represent or shape cultural values and beliefs in developing societies? What is the role of mass media in forging national and ethnic identities, body images, cultural constructs of sexuality and gender, and the perceptions of war and violence in different societies? **Lecture 3, Credits 3 (Biannual)**

ANTH-375

Native American Cultural Resources and Rights

Indian nations have substantial interests in access to and control of their cultural resources. In addition to land, those resources may include objects, traditions, and symbols. Many of those interests may be treated under tribal, federal, and/or international law as forms of property (including access to sacred sites, possession of funerary objects, masks), intangible resources (such as intellectual property of tribal names, symbols, stories), and/or liberty interests (including religious freedom, preservation of tribal languages, customs, Indian arts and crafts). Classroom lectures will be supplemented with roundtable discussions and instructions by museum professionals, guest speakers, and Native American representatives. At the conclusion of the course, students will comprehend the breadth of federal legislation regulating tribal cultural resources as well as the complex legal and social issues facing museums, academic institutions, and the community. **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-380

Nationalism and Identity

Nationalism is often described in terms of strong sentiments and acts of self-determination on the part of members of a nation as distinct from the state that is necessarily a territorially and politically defined entity. This course will explore leading theories related to the origins of contemporary nationalism and nationalism's importance within the context of state societies, especially in Europe. The past as an invented historical or imagined reality will be highlighted, as invented pasts contribute to claims for exclusive national culture and both exclusive and contested identities. The relationships between culture, literacy, and capitalism will be applied to understanding select historical and ethnographic cases of nationalism. **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-385

Anthropology and History

"The past is a foreign country," wrote L. P. Hartley. Anthropologists and historians alike aim to understand the experiences of others, the past, and its relationship to the present. Sometimes anthropologists and historians work in radically different ways and sometimes their work is indistinguishable. What is the difference between historical anthropology and history—and does it matter? In a core line of inquiry, historical anthropologists have traced the expansion of empires and cultural transformations under colonial pressures. Such investigations yield theoretical insights into the dynamics of systems and agency; the interpretation of signs; power, hegemony, acquiescence, and resistance; racialization and the colonial construction of difference; capital accumulation; representations of time; and ontology, epistemology, and authority. In this course, students have hands-on opportunities to access and analyze digitized and published primary documents using anthropological perspectives. **Lecture 3, Credits 3 (Biannual)**

ANTH-410

Global Cities

This course examines the impact of global dynamics on cities from the early 20th century to the present. By tracing urban formations from metropolis to global city, emphasis will be placed on the making of identities, communities, and citizens in the architectural spaces, cultural places, ethnic zones, and media traces of urban life in the context of globalization. **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-415

Archaeological Science

Archaeology is one of the few social sciences that lends itself well to the application of analytical techniques from the physical sciences. This is due to the fact that archaeology relies primarily on physical evidence, artifacts and features, whose origin, composition, age, and manner of production can be elucidated through application of the physical sciences. This course examines the application of physical science techniques to archaeological questions, including the age and origin of materials, how things are made, what people ate, their daily activities, and their state of health throughout their life. The course will include in-class labs in which students have the opportunity to apply some of these techniques and a final research project in which the student picks their own archaeological question to answer. **Lab 2, Credits 3 (Fall or Spring)**

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ANTH-420

Exploring Ancient Technology

While it is commonplace to describe the present era as one dominated by technology, humans have always been critically dependent on technology. Many of today's key technologies such as agriculture, writing, ceramics, woodworking, textiles, glass, and metals were invented before the dawn of recorded history. In this class, we will explore these ancient technologies, how they came to be invented, how they evolved, and how they were integrated into the social and economic life of ancient peoples to become the foundations of modern society. This course features lectures, readings, and hands-on laboratories and projects on ancient technology and experimental archaeology. Laboratories and projects will focus on how scientists create new knowledge about the past by testing hypotheses about ancient technology. The course concludes with either an individual project, such as replicating a particular artifact or process, or a class project, such as building and using a Mesopotamian glass furnace. **Lab, Credits 3 (Fall or Spring)**

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ANTH-425

Global Sexualities

By exploring issues of gender and sexuality in a global context, students will be introduced to anthropological perspectives on the experience of men and women, as gendered subjects, in different societies and historical contexts, including colonialism, nationalism, and global capitalism. In turn, we will explore how cultural constructions of masculinity and femininity are configured by race, class, ethnicity, and sexual orientation. Course materials are drawn from an array of sources, reflecting various theoretical perspectives and ethnographic views from different parts of the world. **Lecture 3, Credits 3 (Fall or Spring)**

ANTH-430

Visual Anthropology

We see others as we imagine them to be, in terms of our values, not as they see themselves. This course examines ways in which we understand and represent the reality of others through visual media, across the boundaries of culture, gender, and race. It considers how and why visual media can be used to represent or to distort the world around us. Pictorial media, in particular ethnographic film and photography, are analyzed to document the ways in which indigenous and native peoples in different parts of the world have been represented and imagined by anthropologists and western popular culture. **Lecture 3, Credits 3 (Fall, Spring)**

ANTH-435

The Archaeology of Death

Death and burial are how most individuals enter the archaeological record and one could say that deliberate burial of the dead is the first direct evidence we have for the emergence of ethical and religious systems of thought. Human remains, their mortuary treatment, and associated material culture illuminate past patterns of social organization, economics, belief systems, health, and the negotiation of gender, status, and identity. In this course we explore the scientific and theoretical tools used to analyze and interpret past mortuary practices, how archaeologists create new knowledge about the past through the formulations and testing of hypotheses, survey mortuary practices from their first occurrence in the archaeological record, and what human remains can tell us about changes in the human experience over time and space. We will learn how human remains are identified, how determinations of age, sex, biological affiliation, health, and injury are made, how to interpret formation processes, to interpret associated material culture to understand the negotiation of gender and status; how humans have cared for the deceased members of their societies at different times and places in the human past; and the ethics of studying human mortuary remains. **Lab 2, Credits 3 (Fall or Spring)**

ANTH-435**The Archaeology of Death**

Death and burial are how most individuals enter the archaeological record and one could say that deliberate burial of the dead is the first direct evidence we have for the emergence of ethical and religious systems of thought. Human remains, their mortuary treatment, and associated material culture illuminate past patterns of social organization, economics, belief systems, health, and the negotiation of gender, status, and identity. In this course we explore the scientific and theoretical tools used to analyze and interpret past mortuary practices, how archaeologists create new knowledge about the past through the formulations and testing of hypotheses, survey mortuary practices from their first occurrence in the archaeological record, and what human remains can tell us about changes in the human experience over time and space. We will learn how human remains are identified, how determinations of age, sex, biological affiliation, health, and injury are made, how to interpret formation processes, to interpret associated material culture to understand the negotiation of gender and status; how humans have cared for the deceased members of their societies at different times and places in the human past; and the ethics of studying human mortuary remains. **Lecture 2, Credits 3 (Fall or Spring)**

ANTH-455**Economics of Native America**

This course will analyze current and historic economic issues faced by Native Americans. It will also examine government policies enacted by and directed toward Native Americans with a focus on their economic implications. This will be done using standard economic models of the labor market, poverty, trade, development, and gaming. **Lecture 3, Credits 3 (Spring)**

ANTH-498**Topics in Anthropology**

This topics course focuses on specific themes or issues in anthropology, chosen by the instructor, vetted by the department chair, announced in the course subtitle on SIS, and developed in the syllabus. The topics of this course will vary, but the course number will remain the same. Students may not repeat the same topic. **Seminar 3, Credits 3 (Fall, Spring)**

ANTH-498**Practicum**

Students will apply the accumulated knowledge, theory, and methods of the discipline to problem solving outside of the classroom. The Practicum may consist of internship, study abroad, or archaeological or ethnographic field school (consisting of at least 160 hours, completed over at least 4 weeks). (This class is restricted to undergraduate students with at least 3rd year standing.) **Internship, Credits 0 - 16 (Fall, Spring, Summer)**

ANTH-499**Co-op**

Paid work experience in a field related to anthropology (at least 160 hours of work, completed over at least four weeks). Students will apply the accumulated knowledge, theory, and methods of the discipline to problem solving outside of the classroom. (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Fall, Spring, Summer)**

ANTH-501**Senior Research Project**

Students will write a library-based research paper or research proposal, bringing to bear the knowledge, methodological skills, and theoretical perspectives accumulated during the prior years of study. (Prerequisites: This class is restricted to students with at least 4th year standing.) **Seminar 3, Credits 3 (Fall)**

ANTH-502**Scholar's Thesis I**

This is the first course of a two-semester Scholar's Thesis sequence in anthropology, in which students will conduct an original research project. In this first course, working with a thesis advisor, students will formulate a research question, conduct a literature review, prepare the research design, write a research proposal, and begin data collection, following the conventions of cultural anthropology or archaeology. (Prerequisites: This class is restricted to students with at least 4th year standing and at least a 3.2 cumulative GPA.) **Thesis 3, Credits 3 (Fall)**

ANTH-503**Scholar's Thesis II**

This is the second course of a two-semester Scholar's Thesis sequence in anthropology or urban studies in which students will conduct an original research project. In this second course, working with a thesis adviser, students will finalize data collection, analyze the data, write and defend a thesis paper, following the conventions of the discipline. (Prerequisites: ANTH-502 or equivalent course.) **Research, Credits 3 (Fall, Spring, Summer)**

ANTH-599**Independent Study**

The student explores in depth a topic of choice, under supervision of a faculty member. The student will typically meet weekly with the instructor to discuss the readings and will write paper(s) that synthesize and critique them, or the student may work with the faculty member on original research. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 12 (Fall, Spring, Summer)**

Communication**COMM-101****Human Communication**

An introduction to the theoretical and conceptual underpinnings of oral, visual, and written communication. Introduces basic communication models, the role of language in communication, symbols and symbol making, issues of audience analysis, and the development of different modes of discourse. Also explores the history of communication and introduces students to basic principles and research in communication studies. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

COMM-105**Foundations of Communication**

An introduction to the discipline of communication and the fields of advertising, journalism, and public relations. Topics include: the history and evolution of the discipline, major theories, principles of ethics, methods of research, writing styles, digital portfolio development, professional organizations, and potential careers. Students meet professors in the School, explore opportunities to engage with the professional and academic community beyond the classroom. (This class is restricted to ADV PUB-BS or PT COMM-BS or COMM-BS or JOURNAL-BS Major students.) **Lecture 3, Credits 3 (Fall, Spring)**

COMM-142**Introduction to Technical Communication**

This course introduces students to current best practices in written and visual technical communication including writing effective email, short and long technical reports and presentations, developing instructional material, and learning the principles and practices of ethical technical communication. Course activities focus on engineering and scientific technical documents. **Lab, Credits 3 (Fall)**

COMM-142**Introduction to Technical Communication**

This course introduces students to current best practices in written and visual technical communication including writing effective email, short and long technical reports and presentations, developing instructional material, and learning the principles and practices of ethical technical communication. Course activities focus on engineering and scientific technical documents. **Lecture 3, Credits 3 (Fall)**

COMM-201**Public Speaking**

The public speaking course is designed to equip the student with knowledge of the theories and principles necessary for formal public speaking. Informative and persuasive speeches are the focus with emphasis on organization, evidence, language use, strategy, delivery, and effective use of media aids. Public speaking is generally offered each semester. **Lecture 3, Credits 3 (Fall, Spring)**

COMM-202**Mass Communications**

The history and development of U.S. media, theoretical aspects of mass communications, the composition of media audiences, law and regulation of mass communications and how the media affect and are affected by society are presented. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

COMM-211**Principles of Advertising**

An introduction to principles and practices of advertising. Topics include advertising theories, ethics, regulation, consumer research, media planning, message strategy, and campaign planning strategy. **Lecture 3, Credits 3 (Fall, Spring)**

COMM-212**Public Relations**

An introduction to the practice of public relations. Topics include history, research areas, laws, ethics, and social responsibilities as they relate to the theory and practice of public relations. **Lecture 3, Credits 3 (Fall, Spring)**

COMM-221**Public Relations Writing**

This course covers a variety of forms of writing for public relations, including news releases, newsletters, backgrounders, public service announcements, magazine queries, interviews, coverage memos, media alerts, features, trade press releases, and public presentations. Students will write for a variety of media including print, broadcast, and the web. **Lecture 3, Credits 3 (Fall, Spring)**

COMM-223**Digital Design in Communication**

In an increasingly visual culture, and culture of online user-created content, non-designers are called upon in the professional realm to illustrate their ideas. Graduates entering the workforce will encounter situations where they will benefit from possessing a visual communication sensibility and vocabulary to communicate effectively with a broad range of audiences, including professional designers. Creative approaches to challenges, such as visual thinking, are also shown to improve students' comprehension and problem-solving abilities. Digital Design in Communication is an opportunity for undergraduates to receive an introduction to principles of visual message design from a critical rhetorical perspective. They will also get the opportunity to apply these principles to a variety of visual products such as advertisements, logos, brochures, resumes, etc. A variety of computer software applications are available to support the research, writing, visualization, and design of messages. **Lecture 3, Credits 3 (Fall, Summer)**

College of Liberal Arts

COMM-253

Communication

An introduction to communication contexts and processes emphasizing both conceptual and practical dimensions. Participants engage in public speaking, small group problem solving and leadership, and writing exercises while acquiring theoretical background appropriate to understanding these skills. **Lecture 3, Credits 3 (Fall, Spring)**

COMM-261

History of Journalism

This course presents the history of American journalism from colonial times to the present, including the advance of press freedom under the First Amendment and how it has affected the development of American media. The influences of Europe, colonial politics in America, national expansion, urbanization, war, and technology are further developed. Journalism's relationship to politics, institutions, and culture will be investigated. Newspaper, magazine, and broadcast industries will be examined for ideas that have changed American journalism. **Lecture 3, Credits 3 (Spring)**

COMM-263

Data Journalism

This course covers how to report on, illustrate, find, and analyze records and databases, with emphasis on investigative reporting. **Lecture 3, Credits 3 (Spring)**

COMM-271

Introduction to Journalism

The course covers the impact/effect of journalism on American society, with an introduction to the history, freedom, technologies, ethics, and functions of the news media. Students will learn how to assess news value, develop news judgment, and analyze news stories. **Lecture 3, Credits 3 (Fall)**

COMM-272

Reporting and Writing I

This course introduces students to the principles and practices of gathering, evaluating, investigating, and presenting information to general audiences. Rights and responsibilities of the press will be analyzed. Although special emphasis will be given to writing and reporting for print publications, other media will be addressed. Special attention will be given to the qualities of writing, especially organization, accuracy, completeness, brevity, and readability. Assignments must conform to Associated Press style. **Lecture 3, Credits 3 (Fall)**

COMM-273

Reporting and Writing II

Practicum in advanced techniques of news gathering, reporting, and writing, with an emphasis on reportorial principles and practices. This class expands upon the processes of gathering, evaluating, investigating, and presenting information to news media audiences previously introduced in newswriting. (Prerequisites: COMM-272 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

COMM-274

News Editing

This course introduces students to the principles and practices of editing hard news and feature articles, including news judgment, story selection, headline writing, copy editing, and picture editing. The course emphasizes reader interest, readability, clarity, verification, and style, as well as legality, ethics, and propriety. (Prerequisites: COMM-272 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

COMM-280

Community Journalism

Community Journalism emphasizes the local aspects of news, and teaches students how to identify "community" beyond a region and a neighborhood. A co-taught course with Photojournalism faculty in the College of Art and Design, Community Journalism sharpens students' reporting skills, and guides them in constructing a reporting project as a complete journalistic package, with visual, artistic and written storytelling components in concert with each other. The final project will be a reported (written) piece with corresponding photographs and multimedia. **Lecture 3, Credits 3 (Fall, Spring)**

COMM-291

Communication for Social Change

The course introduces students to the role of communication, information, and media in social change messaging, particularly in the areas of activism and public advocacy. It takes a critical approach toward understanding the role of communication and communication technologies in the creation and dissemination of messages geared towards social change in a variety of mediated contexts. Students will review relevant theoretical frameworks that commonly inform the study and practice of activism and public advocacy, as well as analyze specific examples and case studies contemporarily, as well as select examples at moments of profound activism since the Civil Rights era of the 20th Century. Students will analyze various forms of activism and examine the role of communication in each. Finally, through the design of a social change communication campaign proposal, students will apply strategic communication approaches that will respond to a social issue that may be local, national or global. **Lecture 3, Credits 3 (Fall, Spring)**

COMM-301

Theories of Communication

An introduction to human communication theory, including a history of the field and major theories from the intrapersonal, language, interpersonal, small group, public, organizational, mass, visual, and computer-mediated communication contexts. Theories based both in the humanities and the social sciences are covered. This course should be taken during the student's second year. (This class is restricted to ADV PUB-BS or PTCOMM-BS, COMM-BS or JOURNAL-BS Major students.) **Lecture 3, Credits 3 (Fall, Spring)**

COMM-302

Interpersonal Communication

Interpersonal communication provides analysis and application of the major theories of interpersonal communication in various situations. The course focuses on perception of self and others, language use, nonverbal communication, and symbolic interaction in the communication of shared meanings in face-to-face and mediated interpersonal relationships. There is a strong focus on both conflict management and intercultural interactions. **Lecture 3, Credits 3 (Fall or Spring)**

COMM-303

Small Group Communication

This course provides students with opportunities to engage in small group decision making and problem solving. Students will analyze and evaluate their own experiences and relate them to theories and research from the field of small group communication. **Lecture 3, Credits 3 (Fall or Spring)**

COMM-304

Intercultural Communication

Intercultural communication provides an examination of the role of culture in face-to-face interaction. Students may find a basic background in communication, anthropology, or psychology useful. **Lecture 3, Credits 3 (Fall or Spring)**

COMM-305

Persuasion

An in-depth study of the theories, practices, effects, and ethics of persuasion. Persuasion is defined as human communication designed to influence one's beliefs, values, attitudes, and actions. This course examines persuasion from a receiver-oriented perspective with interpersonal, small group, organizational, and mediated perspectives. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

COMM-306

Rhetoric of Race Relations

Rhetoric of Race Relations examines the history of the struggle for freedom and equality for blacks in American society. This course traces the history and rhetoric of key spokespersons from the pre-Civil War period to the 20th century as evidenced in texts of selected public speeches and reactions to them. **Lecture 3, Credits 3 (Fall or Spring)**

COMM-321

Copywriting and Visualization

An opportunity for undergraduates to learn the verbal and visual skills utilized in the creation of advertising messages. To create an effective strategy for an advertising campaign, the advertising copywriter/art director team needs to combine linguistic and visual metaphors into a persuasive message. Students will develop creative advertising messages by researching and writing a creative brief and then implementing the plan by transforming concepts into actual advertising messages and campaigns. (Prerequisites: COMM-211 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

COMM-322

Campaign Management and Planning

This course introduces students to the managing and planning of advertising and public relations campaigns. It takes a team project approach thereby helping students learn how to work together in class as well as in a competitive agency. Service-learning will be used to expose students to community causes. (Prerequisites: COMM-211 and COMM-212 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

COMM-341

Visual Communication

This course is an introduction to the study of visual communication. The iconic and symbolic demonstration of visual images used in a variety of media is stressed. The major goal of the course is to examine visual messages as a form of intentional communication that seeks to inform, persuade, and entertain specific target audiences. **Lecture 3, Credits 3 (Fall or Spring)**

COMM-342

Communication Law and Ethics

This course examines major principles and trends in communication law. The course analyzes a broad range of issues related to the First Amendment, intellectual property, and media regulation. Special attention is paid to discussing the major ethical perspectives and issues surrounding contemporary communication behavior. **Lecture 3, Credits 3 (Spring)**

COMM-343**Technology-Mediated Communication**

Technology-mediated communication (TMC) was originally defined as a form of electronic written communication. As networking tools advanced, TMC expanded to include new software developments, such as instant messenger and the web. Today, the term technology-mediated communication is used to refer to a wide range of technologies that facilitate both human communication and the interactive sharing of information through computer networks. Through readings, discussions, and observations of online behavior, students will be introduced to TMC terms and theories to further develop their TMC communication and critical thinking skills. **Lecture 3, Credits 3 (Spring)**

COMM-344**Health Communication**

An introduction to the subject of communication in health care delivery and in public health campaigns, with an emphasis on interpersonal, organizational, and mass communication approaches. Also covered is the interrelationship of health behavior and communication. **Lecture 3, Credits 3 (Spring)**

COMM-346**Global Media**

An introduction to media technologies from a global perspective. Major theories about the media, current trends in media, journalism practices, and governmental challenges and restrictions are reviewed. Students will use various media technologies both locally and abroad through site visits, readings, and online resources resulting in a media production (mini-documentary, movie trailer, and/or international film review). Special focus on the growing importance of the internet and digital media on news flow, advertising, and entertainment. **Lec/Lab 3, Credits 3 (Fall or Spring)**

COMM-356**Critical Practice in Social Media**

With the advent of virtual communities, smart mobs, and online social networks, questions about the meaning of human communication and how we construct our online and offline personal and professional identities need to be reevaluated. This course explores the relationship between social media and the construction of both individual and social identities as well as best practices for constructing the desired community or identity. Although the course is grounded in theory, it is equally committed to practice, and much of the class discussion and activity takes place in various online spaces. As a practicum, those who complete this course will know how to engage productively in practices such as tweeting, blogging, tagging, etc. and will develop an understanding of how these practices affect their construction of identity and community both personally and on behalf of an organization. **Lecture 3, Credits 3 (Fall, Spring)**

COMM-357**Communication, Gender, and Media**

This course examines the relationship between gender and media communication with specific attention to how gender affects choices in mass media and social media practices. Students explore how gender, sexual orientation, sexuality and social roles, affect media coverage, portrayals, production and reception. They consider issues of authorship, spectatorship (audience), and the ways in which various media content (film, television, print journalism, advertising, social media) enables, facilitates, and challenges these social constructions in society. The course covers communication theories and scholarship as it applies to gender and media, methods of media analysis, and topics of current interest. **Lecture 3, Credits 3 (Fall)**

COMM-361**Reporting in Specialized Fields**

An in-depth study, analysis, and practicum of a selected advanced and focused subject in professional journalism. Specific subject matter of the course varies according to faculty assigned and is published when the course is offered; students may enroll in this class no more than twice as long as the specific subject matter is different. Examples include education journalism, health journalism, business journalism, reporting public affairs, sports journalism, editorial (or opinion) writing, and reporting for alternative media. (Prerequisites: COMM-272 or equivalent course.) **Lecture 3, Credits 3 (Fall or Spring)**

COMM-362**Law and Ethics of the Press**

This course examines major principles and trends in communication law. The course analyzes a broad range of issues related to the First Amendment, intellectual property, and media regulation. Special attention is paid to discussing the major ethical perspectives and issues surrounding contemporary communication behavior. **Lecture 3, Credits 3 (Spring)**

COMM-370**Ethnic Press in the United States**

The course examines the role of the ethnic press in the U.S. and the communities they serve, both historically and contemporarily. Students will pay close attention to how the audiences and their relationships to these media sources have shifted over time due to the news consumers' changing citizenship status, and shifting linguistic practice and cultural histories. While print newspapers will be the primary source focus due to their foundational role within the ethnic press, students will also explore television broadcasts, online and streaming news and their social media counterparts. Students will learn about the historic and ongoing roles these media outlets play with acculturation and social reform, including the fight for racial and religious equity. Financial viability and tensions with the mainstream press will also be explored. **Lecture 3, Credits 3 (Fall or Spring)**

COMM-374**Opinion Media**

Opinion Media teaches students how to craft persuasive personal essays, commentary and op-eds, and get them published on news sites, in trade magazines, in newspapers and on influencer blogs. By drawing upon the ethical deployment of evidence, including argument, anecdote and statistical data, student authors will learn how to become influencers and thought leaders through the deployment of the written word and multimedia texts, including writing scripts, and producing video, for their own social media channels. This course is ideally suited for those seeking to sharpen their persuasive writing skills to sell their ideas, vision, expertise and life experience to a targeted media audience. **Lecture 3, Credits 3 (Fall)**

COMM-401**Quantitative Research Methods**

An introduction to the methods and ethics of scientific, scholarly communication research including methods of locating, analyzing, critiquing, and conducting communication research. The course focuses on empirical research methods and leads to the development of a research project proposal suitable for implementation in senior thesis in communication. This course should be taken during the student's third year. (Prerequisites: COMM-301 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

COMM-402**Qualitative Research Methods**

Introduction to the methods and ethics of qualitative and critical research. Students are introduced to interviewing, participant observation, naturalistic study, and ethnography. They also develop a disciplined ability for the critical appraisal of public discourse, cultural phenomenon, and designed objects. Both qualitative and critical research methods rely on the researcher's observational, analytic, and critical skills, and seek to understand the behaviors, beliefs, values, attitudes, assumptions, rituals, and symbol systems that characterize relationships between the source, message, media, and audience of specific communication acts. Students will also investigate the processes of rhetorical action. By the end of the course, students will have developed a research proposal suitable for implementation as the senior thesis in communication. This course should be taken during the student's third year. (Prerequisites: COMM-301 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

COMM-421**Media Planning**

An introduction to developing, executing, and managing media plans for advertising and public relations. This course covers the characteristics and uses of advertising media, media terms and calculations, media strategies and tactics, and media plan development and implementation. (Prerequisites: COMM-211 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

COMM-450**Multiplatform Production and Publishing**

This course introduces students to the principles and practices of using multiple mediums to tell stories on multiple platforms, including written text, video, photo, audio, immersive media and other new and evolving forms of media. The course familiarizes students with the tools and techniques of a multiplatform storyteller, for example, digital content strategy, story concept ideation, pre-production, production, post-production and dissemination through new and evolving platforms. Additionally, students explore current examples of multiplatform stories. **Lec/Lab 3, Credits 3 (Fall or Spring)**

COMM-461**Multiplatform Journalism**

The internet is an important source of news information, rivaling print, radio, and television news. This course introduces students to the principles and practices of online news reporting, including writing for mainstream news sites, journalistic blogs (web logs), share and discussion sites, and other evolving online news outlets. The course familiarizes students with the tools of the online reporter: for example, vetting sources on the web, conducting e-mail interviews, and writing for web pages. Also, students explore the cultural and ethical terrain unique to the wired environment. (Prerequisites: COMM-272 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

COMM-489**Topics in Communication**

An in-depth examination of a selected aspect of the communication discipline (e.g. strategic communication, technical communication, visual communication, computer mediated communication, advertising, public relations, journalism). Topics in Communication can be taken multiple times provided the topic being studied has changed. **Lecture 3, Credits 1 - 4 (Fall or Spring)**

COMM-490**PR Practicum**

The PR Practicum is an opportunity for students to participate in activities and learning experiences as part of the RIT chapter of the PRSSA (Public Relations Student Society of America). Activities will include a weekly chapter meeting, participation in PRSSA competitions and community activities, and presentations by PR professionals. Other activities may include visits to PR agencies and optional travel to regional PR conferences. (Prerequisites: COMM-212 or equivalent course.) **Studio 1, Credits 1 (Fall, Spring)**

College of Liberal Arts

COMM-497

Communication Portfolio

Communication, advertising, and public relations majors create a portfolio comprised of projects, papers, and related professional materials; Journalism majors complete a senior project. Near the end of every semester, the department hosts a portfolio review day when department of communication seniors present their portfolio or project work in a public space for review and comment by faculty, staff, and peers. The presentation constitutes completion of the course. (Prerequisites: At least 4th year student standing in ADVPUB-BS, PTCOMM-BS, COMM-BS or JOURNAL-BS.) **Studio, Credits 0 (Fall, Spring, Summer)**

COMM-499

Communication Co-Op

One semester of full-time paid work experience in a professional setting related to the communication major. (This class is restricted to ADVPUB-BS or PTCOMM-BS, COMM-BS or JOURNAL-BS Major students.) **CO OP, Credits 0 (Fall, Spring, Summer)**

COMM-501

Senior Thesis in Communication

A guided research seminar culminating in a major project that brings together the communication students' communication studies and substantive work in his or her professional core. Focuses on designing, conducting, and completing an independent research project. The progress of each project is shared with the class for discussion and critiques. (Prerequisites: COMM-401 and COMM-402 or equivalent course and student standing in ADVPUB-BS, COMM-BS or PTCOMM-BS program.) **Seminar, Credits 3 (Fall or Spring)**

COMM-503

Advanced Public Speaking

Further development of knowledge and skills learned in public speaking. This course emphasizes language, delivery, and speech organization, requiring students to develop and deliver speeches for various occasions, using a variety of delivery methods. Students will present out-of-the-classroom speeches as well as practice ghostwriting. (Prerequisites: COMM-201 or equivalent course.) **Seminar, Credits 3 (Spring)**

COMM-561

Senior Project

Senior capstone course culminating in the production of a long-form piece of journalism, a website and a digital portfolio of select works. The course brings together each participant's work in journalism and the professional core. (Prerequisites: COMM-461 or equivalent course.) **Seminar, Credits 3 (Spring)**

COMM-599

Independent Study

A program of study executed by an individual student with assistance and guidance by an instructor, outside a classroom setting. Guidelines for designing and gaining approval for an independent study are provided in College of Liberal Arts Policy I.D. **Ind Study, Credits 1 - 12 (Fall, Spring, Summer)**

Criminal Justice

CRIM-100

Seminar in Criminal Justice

This seminar acquaints students with key resources for understanding and conducting criminal justice research. The course involves extensive reading, writing, and discussion. It covers the principles of the criminal justice system including the relationship between system components, their effectiveness, and theories of operation and reform. Consideration is also given to specific problems within the branches of the criminal justice system. (This course is restricted to CRIM-BS Major students.) **Seminar, Credits 3 (Fall, Spring)**

CRIM-110

Introduction to Criminal Justice

This course provides an introduction to criminal justice. One of the primary goals of this course is to provide a general understanding of how the criminal justice system responds to crime in society. The main component parts of the criminal justice system (i.e., police, courts, and corrections) will be examined with a particular emphasis on developing an understanding of the behavior and interactions among the main actors in the criminal justice system. To accomplish this goal, we will examine how criminal cases are processed in the criminal justice system. We will also consider how external forces, such as political decisions, public opinion, and the media influence criminal justice decision-making. Students will also formulate, argue, and evaluate ethical perspectives regarding criminal justice systems, individual-level decisions, and recognize relationships with other ethical problems in society. Finally, throughout the course we will emphasize how the societal response to crime has evolved over time. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

CRIM-120

Criminology, Social Justice, and Community Action

Understanding criminology and social justice or injustice embodies a study of the social, cultural, and institutional responses to and effects of inequality in any society. The course embodies rigorous intellectual engagement through a structure that includes a foundation in social justice and community and the development of critical thinking about efforts to address social justice issues. The course explores the relationship between poverty and inequality with racial and ethnic discrimination. Students will develop strategies to address at least one issue that each student identifies during the course. **Seminar 3, Credits 3 (Int)**

CRIM-210

Technology in Criminal Justice

Develops understanding of theories, management processes, organizational capabilities and social implications of criminal justice technologies. Many categories of technology are considered, ranging from communications and records management, to special assault and protection tactics. Students consider the role of industry, government, and user groups in the historical development and legal/ethical use of specific technologies. (Prerequisites: CRIM-110 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

CRIM-215

Law and Society

This course focuses on the relationships between law and other social institutions, and examines the values and interests that are expressed in law and shaped by legal structures and processes. Consensus and conflict perspectives of the law are compared and contrasted, and applied to understanding the law's impact on everyday life. This course takes an explicit interdisciplinary approach to understanding law. **Lecture 3, Credits 3 (Biannual)**

CRIM-220

Corrections

Introduction to the basic organizations of the correctional system, their functions and performance. Prisons and jails, as well as probation and parole agencies, are discussed within the context of historical and contemporary philosophy. Attention also is focused on decision-making functions, the role of various personnel within the correctional system and the population of offenders within it. Strategies for rehabilitation and their effectiveness are surveyed. (Prerequisites: CRIM-110 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

CRIM-225

Criminal Law

Criminal Law deals with the substantive and procedural criminal law. Characteristics of crimes against people, property, and the state will be examined. Emphasis will be placed on the nature of criminal conduct, the requirement of criminal intent, and legal causation. In addition, the principal defenses will be examined. (Prerequisites: CRIM-110 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

CRIM-230

Juvenile Justice

This course examines the concepts, theories and environmental influences of juvenile offenders, the impact of the judicial system, control and corrections on juvenile justice. The course also examines the role of forces in the system including police, courts, community resources, and treatment. (Prerequisites: CRIM-110 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

CRIM-235

Crime, Justice and Communities

This course provides an overview of the role of communities in crime and criminal justice. The course begins by laying a foundation in community theory. Students will gain an understanding of the critical dimensions and attributes which define community. From here the course will emphasize how these critical community dimensions are related to both crime and criminal justice. We will discuss the extent to which structural characteristics (e.g., poverty, residential mobility, etc.) and social processes (e.g., social capital, collective efficacy, etc.) are related to crime and disorder. The course will also examine the potential that exists within criminal justice to intervene in communities to reduce crime and disorder and build community in the process. Central to this will be a discussion of co-production (i.e., the intersection between formal and informal social control). The remainder of the course will examine how the major components of criminal justice (i.e., police, courts, and corrections) have attempted to intersect with communities. These topics will include community policing, comprehensive community initiatives, community problem-solving, community prosecution, restorative justice, and community corrections/offender re-entry. (Prerequisites: CRIM-110 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

CRIM-240

Law Enforcement in Society

This course examines the social and historical origins of the various police systems; police culture, role and career; police in the legal system; social and legal restraints on police practices; police discretion in practice; police and community; police organization and community control mechanisms. (Prerequisites: CRIM-110 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

CRIM-245

Prostitution and Vice

This course will examine prostitution and vice in the United States and globally. Through empirical scholarship, various issues will be examined including issues faced by sex workers including crime, victimization, health and safety, and law and policy issues. Quality of life issues for communities will also be examined. (Prerequisites: CRIM-110 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

CRIM-250

Domestic Violence

This course focuses on domestic violence in the United States and globally. Various types of domestic violence will be examined, including intimate partner violence, child abuse, and elder abuse. The course will also examine criminal justice responses to domestic violence, including police, court processing of domestic violence cases and punishment of domestic violence offenders. (Prerequisites: CRIM-110 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

CRIM-255**Seminar on Sexual Violence**

This course focuses on sexual violence in the United States and globally. Various types of sexual violence will be examined, including incest, elder abuse, and male victimization. The course will also examine criminal justice responses to sexual violence, including police, court processing of sexual violence cases and punishment and treatment of sexual offenders. (Prerequisites: CRIM-110 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

CRIM-260**Courts**

This course provides students with an understanding of the recognized functions of courts in the American criminal justice system. Jurisdiction, policies and procedures of courts in the administration of criminal justice, including trial and appellate courts, will be discussed. Courts will be examined at the local, state and federal levels. (Prerequisites: CRIM-110 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

CRIM-265**Women and Crime**

This course deals with women as criminal offenders and as victims of crime, focusing upon theories about women in crime, types of crimes committed, patterns of criminality and the treatment of women offenders. Also examines the role of women as law enforcement officers, judges, lawyers and correctional officers in the criminal justice system. (Prerequisites: CRIM-110 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

CRIM-270**Current Issues in Criminal Justice**

This course involves yearlong participation in, and written critique of, a designated set of lectures, roundtables and presentations on topics covering current issues in criminal justice. The goal is to engage students in discussion of current issues with their peers and with experts in the field. (Prerequisites: CRIM-100 or equivalent course.) **Lecture, Credits 1 - 3 (Spring)**

CRIM-275**Crime and Violence**

This course focuses on the outbreak and prevalence of violent crime in the United States as one of the most important social realities of the past 100 years. In addition to a historical review, we will also scrutinize contemporary problems associated with violence. These problems include street violence, terrorism, riots, vigilantism, and how the criminal justice system has attempted to control these problems. (Prerequisites: CRIM-110 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

CRIM-285**Minority Groups and the Criminal Justice System**

This course will investigate the roles played by racial minorities- African-Americans, Native Americans, Hispanic Americans, and Asian Americans-- at each level of the criminal justice system in the United States of America and globally. The experience of African Americans will be emphasized since this group has been the subject of more extensive research by criminologists and criminal justice practitioners. (Prerequisites: CRIM-110 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

CRIM-290**Computer Crime**

This course provides definitional, theoretical, and operational context for understanding computer-based competition, conflict and crime in the information age. Students study the history, nature and extent of computer-related crime, as well as differing types of computer criminals, their motivations and the methods they use to threaten, attack, compromise or damage physical, and cyber assets. The course considers legal and regulatory environments and the impact these have on policies and practices related to ethics in the management of information security, data encryption, privacy, and numerous other special topics. (Prerequisites: CRIM-110 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

CRIM-299**Crime, Justice and Ethics**

This course provides an introduction to ethical theories, consideration of justice as operationalized in contemporary criminal justice and emerging issues that accompany technological advancements such as video surveillance. Students will explore how ethical frameworks are embedded, implicitly and explicitly, in fundamental questions that are resolved by police, judges, and prosecutors. Conceptions of justice and criminal justice will be considered as they relate to criminological and criminal justice theories such as Procedural Justice/Legitimacy theories, Restorative Justice, as well as rationales for punishment. Implications for evaluation of technological changes in criminal justice will also be considered from the perspectives of ethical choices. **Lecture 3, Credits 3 (Spring)**

CRIM-300**Quantitative Methods for Criminal Justice**

This course is designed to provide students with a foundation in social science research methods. Through lecture, discussion and activities associated with a research project, emphasis is placed on the creation of null hypotheses, identification of the relationships among variables, establishment models, and analysis of data using both parametric and non-parametric statistics. Required course for criminal justice majors. (Prerequisites: CRIM-100 and CRIM-110 or equivalent course and at least 3rd year standing.) **Lecture 3, Credits 3 (Fall)**

CRIM-310**Seminar in Law**

Focuses on the nature, function and limits of the rule of law. This course traces the history and development of the 4th, 5th, 6th, and 14th Amendments of the United States Constitution. This will be accomplished by reading and discussing approximately 100 United States Supreme Court decisions from the early 1900's through the present. Students will also be introduced to the concept of briefing a case. **Lecture 3, Credits 3 (Biannual)**

CRIM-315**Evidence**

Provides the student with an awareness of what types of evidence are admissible in a criminal trial. Includes a comprehensive analysis of the most frequently used rules of evidence. There are readings and discussions pertaining to the nature of real, testimonial, hearsay and circumstantial evidence. Examines rules concerning the cross-examination of witnesses, exceptions to the exclusion of hearsay evidence, the burden of proof, the provinces of the judge and of the jury, legal presumptions, and the exclusion of illegally obtained evidence. **Lecture 3, Credits 3 (Biannual)**

CRIM-350**Theories of Crime and Criminality**

A comprehensive survey of historical and contemporary theories of the causes of crime. Included are theories that derive from biological, psychological, sociological, geographic, economic, and political perspectives. Development of criminological theory reviewed; fundamental distinctions between classical and positivist theories and between theories of crime and criminality discussed. **Lecture 3, Credits 3 (Fall, Spring)**

CRIM-400**Research Methods**

This course is designed to provide students with a foundation in social science research methods. Through lecture, discussion, and activities associated with a research proposal, the different methods of conducting research are presented. Stress is on issues of deducting hypotheses from theoretical frameworks, variable construction, experimental design, sampling methodology, and the techniques and methods of data collection. Students will formulate a written research proposal that details a research question and the research question and the research design appropriate for addressing that question. (Prerequisites: CRIM-300 and CRIM-350 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

CRIM-488**Professional Issues in Criminal Justice**

Focuses on contemporary issues and topics not otherwise distinctly incorporated in established criminal justice courses. Concentrates on student discussion and interaction surrounding applications in criminal justice. Examples could include training in software for agency data cleaning. Elective course for criminal justice majors. Does not have general education status. (Prerequisites: CRIM-110 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

CRIM-489**Major Issues in Criminal Justice**

Focuses on contemporary issues and topics not otherwise distinctly incorporated in established criminal justice courses. Concentrates on student discussion and interaction surrounding required readings on topics such as crime prevention and issues in the prosecution/court system. Recent examples include cyberlaw, prisoner re-entry restorative justice, wrongful convictions, crime mapping, crime analysis, non-traditional courts, legal controversies in the law, substance abuse, and legal research. (Prerequisites: CRIM-110 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

CRIM-500**Seminar in Criminal Justice and Public Policy**

This course provides an overview of the public policy process as it relates to issues of crime and criminal justice. Students will gain an understanding of the socio-political context of criminal justice public policy, the public policy process, and the challenges facing successful policy implementation that are unique to criminal justice. The beginning of the course will emphasize public policy designed to control or limit the behavior and discretionary decisions of criminal justice officials. The remainder of the course will emphasize public policy designed to enhance the control, supervision, and processing of criminal offenders. (Prerequisites: CRIM-400 or equivalent course.) **Seminar, Credits 3 (Fall, Spring)**

CRIM-550**Field Experience**

Internship practicum for all criminal justice students. Gives the student first-hand experience in the field of criminal justice in an appropriate organization that meets the needs of the student's career objectives. Students are closely supervised at selected organizations, developing their preprofessional skills while learning the organization's programs and methods. (Prerequisites: CRIM-400 or equivalent course.) **Internship, Credits 3 - 6 (Fall, Spring)**

College of Liberal Arts

CRIM-560

Project Based Learning in Criminal Justice

This course engages students in research that builds on problem identification and analysis in criminal justice. Topics may include exploration of community issues and views on justice, health and medical approaches to crime problems, practitioner orientations and practices relative to specific issues in criminal justice, and applications of new techniques, such as data science, to contemporary problems. Students will apply theoretical frameworks towards understanding the scope and nature of the problem in the form of working papers. The class culminates in a final project which will involve analysis and evaluation research components addressing the underlying problem/issue/program in consultation with the instructor. (Prerequisites: CRIM-100 and CRIM-110 and CRIM-300 and CRIM-400 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

CRIM-599

Independent Study

A program of study executed by an individual student with assistance and guidance by an instructor, outside a regular classroom setting. Guidelines for designing and gaining approval for an independent study are provided in College of Liberal Arts Policy I.D. **Ind Study, Credits 1 - 6**

Digital Humanities

DHSS-101

Computation and Culture

The course provides a basic introduction to the application of computation in the research and practice of the humanities, arts, and social sciences. The class offers students entry to work with archival theory and practice; textuality and electronic scholarly communication; data mining, analysis, and visualization; the spatial and temporal "turns;" game studies and digital arts. The course offers hands on experimentation with software platforms available to create scholarly and artistic production and theoretical approaches to digital presentation. Students will complete assignments requiring conceptual, aesthetic, and practical approaches to digital engagement with cultural materials. While no programming knowledge is required, students will design and create an online project using tools and platforms that are considered standard practice in the field, and reflect critically on the utility of digital techniques in their dialogue with the humanities. **Lecture 3, Credits 3 (Fall)**

DHSS-102

Industrial Origins of the Digital Age

The central focus of this course will be the excavation of textual, visual, and sonic materials, obsolete or emerging. The archaeological metaphor evokes both the desire to recover material traces of the past and the imperative to situate those traces in their social, cultural, and political contexts. How does the digital age imagine backwards to the Industrial Age and vice versa? Is it true that virtually everything that is being invented now for a digital age had its origins in the late nineteenth and early twentieth century industrial age? (inventions of telegraphy and telephony, electricity, photography, cinema, the automobile, the Dewey Decimal and Library of Congress classification systems, muckraking and sensationalist journalism, celebrity culture, the skyscraper, the office, the typewriter, the Brownie camera). We will take a research approach that explores moments in which both familiar and unfamiliar devices have yet to emerge as significant or disappear as curiosities. **Lecture 3, Credits 3 (Spring)**

DHSS-103

Ethics in the Digital Era

The course will examine various contemporary and global issues of digital citizenship and new ethical challenges raised by digital technology. The course will raise questions regarding how digital technology has changed citizenship practices: Who has access to full citizenship, and why? What responsibilities are entailed in digital citizenship? Themes may include the nature and value of digital technology; the relations between digital technologies and knowledge-making/meaning-making; the value of information privacy; the role of digital media in society and human interactions; issues arising from the life-cycle of new digital tools and data repositories; and questions broadly related to questions of accessibility, representation, and sustainability as applied to digital technologies. Topics may also include research ethics, piracy and file sharing, hacktivism, copyright and fair use, end-user license agreements, alternative news media, and participatory culture. Students will take up both broad ethical issues and specific professional codes and policy in diverse domains. **Lecture 3, Credits 3 (Spring)**

DHSS-200

DHSS Seminar

This is a one-credit seminar course that assists DHSS majors in their professional development and prepares them to locate and obtain co-ops and jobs in their field. It also provides a forum for DHSS majors to receive feedback on their own creative projects in preparation for their senior capstones. Faculty and students will also discuss emerging events related to the field of DHSS. Students may take this course repeatedly for credit up to four times. **Lecture 1, Credits 1 (Fall)**

DHSS-377

Media Narrative

The contemporary understanding of communication and narrative is quickly shifting in a world where media is ubiquitous. The "language of new media" is the thematic used in this course to discuss contemporary and historic forms of non-linear narrative. Students will explore the properties of non-linear, multi-linear, and interactive forms of narratives. This course will survey some of the possibilities, examining both traditional and new media such as oral storytelling, literature, poetry, visual arts, museum exhibits, architecture, hypertext fiction, Net Art, and computer games. Writers on communication culture, gaming, television, digital aesthetics, contemporary art and film, as well as synchronic narrative will be addressed. The focus is to develop critical tools to analyze contemporary media as well as a minimal level of practical implementation. Students will produce a final media project. **Lecture 3, Credits 3 (Spring)**

DHSS-488

Special Topics

A critical examination/practicum in an area of digital humanities not covered in other digital humanities and social sciences courses. Counts as a program elective for the DHSS degree program, and may be taken as a general education elective if approved by the general education committee. **Lecture 3, Credits 3 (Biannual)**

DHSS-489

DHSS Capstone I

This course is intended for students in the DHSS program to produce critical and creative projects that apply digital technologies to a field of inquiry in the humanities and/or social sciences, while being guided by faculty advisors. Students will acquire a client (faculty member, not-for-profit organization, or cultural heritage site) and will be supervised by the advisor as they develop the research agenda, develop the project management plan, construct all necessary IRB materials, intellectual property documents, and copyright permissions, and develop a working prototype. This course will culminate in an online publishable project and a written rationale with theoretical grounding, as well as explanation of practical decisions and applications. It is expected that the project will be somewhat novel, will extend the theoretical understanding of previous work, and go well beyond any similar projects that they might have contributed to in any of their previous courses. The 6-hour course sequence is designed to be distributed over two consecutive semesters in order to allow for long-term, in-depth development of projects. **Research 3, Credits 3 (Fall)**

DHSS-490

DHSS Capstone II

This course is intended for students in the DHSS program to produce critical and creative projects that apply digital technologies to a field of inquiry in the humanities and/or social sciences, while being guided by faculty advisors. Students will acquire a client (faculty member, not-for-profit organization, or cultural heritage site) and will be supervised by the advisor as they develop the research agenda, develop the project management plan, construct all necessary IRB materials, intellectual property documents, and copyright permissions, and develop a working prototype. This course will culminate in an online publishable project and a written rationale with theoretical grounding, as well as explanation of practical decisions and applications. It is expected that the project will be somewhat novel, will extend the theoretical understanding of previous work, and go well beyond any similar projects that they might have contributed to in any of their previous courses. The 6-hour course sequence is designed to be distributed over two consecutive semesters in order to allow for long-term, in-depth development of projects. **Research 3, Credits 3 (Spring)**

DHSS-499

DHSS Co-Op

A semester or summer-length experience in a professional setting related to the digital humanities and social sciences major, with a minimum of 350 hours. (Prerequisites: This class is restricted to DIGHSS-BS Major students with at least 2nd year standing. 2nd Year & DIGHSS-BS) **CO OP, Credits 0 (Fall, Spring, Summer)**

Economics

ECON-100

Foundational Seminar in Economics

This course is designed to introduce new students in the economics program (freshmen and external and internal transfers) to the application of economic analysis in academia, business, government and the not-for-profit sector. Students will be exposed to the research and consulting activities undertaken by academic economists and economic practitioners as well as a discussion of the career outcomes of the alumni of the RIT economics program. (This course is restricted to ECON-BS Major students.) **Seminar, Credits 0 (Fall, Spring, Summer)**

ECON-101

Principles of Microeconomics

Microeconomics studies the workings of individual markets. That is, it examines the interaction of the demanders of goods and services with the suppliers of those goods and services. It explores how the behavior of consumers (demanders), the behavior of producers (suppliers), and the level of market competition influence market outcomes. **Lecture 3, Credits 3 (Fall, Spring)**

ECON-101H**Honors Microeconomics**

This course introduces students to some of the important questions addressed in Microeconomics and the methodology used to address these questions. We will look at some of the basic models of consumer and firm behavior and study how implications are derived from these. We will also see how some of these simple models give insight into diverse questions such as: Should food stamps be given away freely to those who are poor, or should they be required to purchase them? Why are general practitioners (as opposed to specialists) disproportionately located in smaller towns? Why do firms bundle goods rather than just selling them separately? As far as the final impact is concerned, is there a difference in whether a tax is imposed on the sellers of a product or on buyers of a product? Microeconomics gives the tools to understand and evaluate implications of government as well as business policy decisions. In addition, it provides the foundation for the study of many other sub-disciplines in economics. (Honors Students) **Lecture 3, Credits 3 (Biannual)**

ECON-102**Economics, Ethics, and Society**

This course introduces students to an historical overview of economic theories and policies with special emphasis on their ethical perspectives and implications. The course examines the main economic theories including, but not limited to, Classical Economics, Keynesian Macroeconomics, Austrian, and Marxist Economics. The course will also examine the ethical aspects of Capitalism, Feudalism, Socialism, and other economic forms. **Lecture 3, Credits 3 (Spring)**

ECON-201**Principles of Macroeconomics**

Macroeconomics studies aggregate economic behavior. The course begins by presenting the production possibilities model. This is followed by a discussion of basic macroeconomic concepts including inflation, unemployment, and economic growth and fluctuations. The next topic is national income accounting, which is the measurement of macroeconomic variables. The latter part of the course focuses on the development of one or more macroeconomic models, a discussion of the role of money in the macroeconomy, the aggregate supply-aggregate demand framework, and other topics the individual instructor may choose. (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

ECON-401**Intermediate Microeconomic Theory**

This course develops the tools that are commonly used to study the allocation of resources in a private enterprise economy. Topics covered include the theory of consumer behavior, cost and production, and alternate market structures. (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course and MATH-161 or MATH-171 or MATH-181 or MATH-181A or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

ECON-402**Intermediate Macroeconomic Theory**

The central question of macroeconomics is the determination of output, employment, and prices. This course develops models which incorporate behavioral assumptions concerning consumption, investment, and the role of money and their relationship to macroeconomic variables. Macroeconomics, unlike microeconomics, has been in a constant state of flux during the 20th and into the 21st century. Theories which purport to explain macroeconomic behavior have come into and gone out of fashion depending upon institutional changes and external factors. This course will primarily focus on examining four macroeconomic theories; the Classical, Keynesian, Monetarist, and New Classical models. In addition, macroeconomic public policy will be analyzed in the context of recent economic history. This analysis will be extended to consider open economy macroeconomics in a global context. (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course and ECON-201 and (MATH-161 or MATH-171 or MATH-181 or MATH-181A) or equivalent course.) **Lecture 3, Credits 3 (Fall or Spring)**

ECON-403**Econometrics I**

Econometrics I provides students with the opportunity to develop their skills in applied regression analysis. It covers various regression estimation techniques, data preparation and transformation, and the interpretation of regression results. There is particular emphasis on the dangers of misuse of regression techniques. The course covers regression analysis for both cross-sectional and time series data. (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course and (MATH-171 or 1016-171T or MATH-181 or MATH-181A) and (STAT-145 or STAT/CQAS-251 or MATH-251 or STAT-205 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

ECON-404**Mathematical Methods: Economics**

Mathematical Methods: Economics provides students with an introduction to quantitative techniques used in economics such as matrix algebra, one- and multi-variable differential calculus, and unconstrained and constrained optimization. The emphasis of the instruction is on the application of these techniques to fortify and broaden a student's understanding of traditional economic topics like utility maximization, cost minimization, duality in consumer theory, expected utility, and profit maximization. (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course and (MATH-171 or MATH-181 or MATH-181A) or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

ECON-405**International Trade and Finance**

This course first surveys the sources of comparative advantage. It then analyzes commercial policy and analyzes the welfare economics of trade between countries. Some attention is paid to the institutional aspects of the world trading system. Finally, the course introduces the student to some salient notions in international finance such as national income accounting, the balance of payments, and exchange rates. (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course and ECON-201 or equivalent course.) **Lecture 3, Credits 3 (Fall or Spring)**

ECON-406**Global Economic Issues**

This course is focused on understanding economic problems in a global perspective. The students will study the impact of globalization on economic growth and income disparity among countries. Global economic issues such as poverty, hunger, refugees, and transnational terrorism will be studied. We will also discuss global efforts to attain progress such as the United Nations Millennium Development Goals. The course work will emphasize the analysis of international economic data. (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course.) **Lecture 3, Credits 3 (Spring)**

ECON-407**Industrial Organization**

The study of the structure, conduct and performance of contemporary American industry. Involves the application of the tools of microeconomic analysis and empirical evidence to aid in understanding the behavior of modern industry. In addition, the course considers the historical determinants of contemporary market structure and the public policy measures designed to preserve a competitive market structure. The course concludes with an examination of alternative intellectual property rights mechanisms and how alternative mechanisms impact firm-level and economy-level innovation rates. (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course.) **Lecture 3, Credits 3 (Fall, Spring)**

ECON-410**Game Theory with Economic Applications**

Game theory uses a mathematical approach to study situations of strategic interdependence, i.e., situations with two or more players in which each player's decision influences payoffs of other players and players are aware of this fact when making their decisions. Game theory has been applied to understand diverse economic, political and biological phenomena. We will study how to formulate situations of strategic interdependence as game theoretic models; how to explain/predict behavior of the parties involved, through the use of various equilibrium concepts; and/or identify guidelines for appropriate behavior. The concepts and methods will be illustrated with many examples. The objective is to introduce you to language of game theory and its methodology, and to develop analytical reasoning skills. (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course.) **Lecture 3, Credits 3 (Fall, Spring)**

ECON-411**Computational Economics**

The objective of the course is to introduce students to computational modeling in economics. The course is intended for students who wish to learn what role computation can play in economics, how to create computational models for studying economic phenomena, and how to use these computational economic models to draw insights into economic phenomena. We will use programming languages such as Julia, Python and R for modeling and analysis. (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course.) **Lecture 3, Credits 3 (Biannual)**

ECON-421**Natural Resource Economics**

This course develops an economic perspective on one of the most important and challenging issues facing global society: the allocation, use, and preservation of natural resources. The course presents and discusses the methodology economists use to inform natural resource managers and policy makers. Economic thought and analysis are used to evaluate a variety of issues in this area. The course concludes with a brief discussion of the interdisciplinary aspects of natural resource management. (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course.) **Lecture 3, Credits 3 (Fall)**

ECON-422**Benefit-Cost Analysis**

Benefit-Cost Analysis fosters better understanding of the efficiency consequences of governmental micro-economic actions, both regulatory and fiscal. The course explores the logic, value and limitations of benefit-cost analysis as a public policy tool commonly used, and misused, in comparing the relative merits of alternative government actions. (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course.) **Lecture 3, Credits 3 (Spring)**

ECON-430**Managerial Economics**

Managerial Economics involves the application of economic theory to business decision-making. Most of the emphasis is microeconomic in nature, the theory of the firm and consumer theory, but there is some macroeconomic influence, particularly in the forecasting area. Since this is an applied economics course, it has a strong quantitative flavor. (Prerequisites: (ECON-101 or completion of one (1) 400 or 500 level ECON course) and ECON-201 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

ECON-431 **Monetary Analysis and Policy**
This course is a study of monetary behavior and the role of monetary institutions in the modern economy. The primary focus of the course is upon understanding how money plays a role in individual decision making units (i.e., households and businesses) and ultimately affects the macroeconomy (e.g., output, employment and inflation). The first part of the course begins with a discussion of economic methodology including introduction to regression analysis and an overview of money and the financial system; the course then proceeds to a discussion of interest rates, portfolio analysis and exchange rates. The second part of the course considers how money affects the macroeconomy by discussing the money supply process and considering theories which explain how changes in the money supply affect the economy. (Prerequisites: (ECON-101 or completion of one (1) 400 or 500 level ECON course) and ECON-201 or equivalent course.) **Lecture 3, Credits 3 (Biannual)**

ECON-432 **Open Economy Macroeconomics**
Open economy refers to an economy that interacts with other economies. Therefore, open economy macroeconomics studies how these interactions affect economies at the aggregate level. The main objective of this course is to analyze how exchange rates affect an economy in both the short run and the long run. This course also examines the role of government and central banking systems in affecting macroeconomic policy in an open economy. (Prerequisites: (ECON-101 or completion of one (1) 400 or 500 level ECON course) and ECON-201 or equivalent course.) **Lecture 3, Credits 3 (Biannual)**

ECON-433 **Financial Economics**
The main objective of the course is to analyze financial decision-making and the role of the financial sector in modern life. The course explores economic theory and modeling of asset pricing, risk management, and digital currency (cryptocurrency). The course examines the history of financial institutions and regulations in an economy and the important roles they have in promoting economic stability and growth. (Prerequisites: ECON-101 and ECON-201 and (MATH-161 or MATH-171 or MATH-181 or MATH-181A) or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

ECON-440 **Urban Economics**
Urban economics is the application of economic analysis to spatial relationships in densely populated (urban) areas. The course develops economic models that explain the existence and growth of cities; the location behavior of consumers and businesses in cities; and the economic rationale and effects of zoning and growth controls. The course then applies the insights gained from these models to a number of urban issues. (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course.) **Lecture 3, Credits 3 (Biannual)**

ECON-441 **Labor Economics**
Labor Economics encompasses aspects of human involvement in the production & distribution of goods and services. We will examine models of behavior starting with the supply of and derived demand for labor. Through the course, we will investigate questions such as: What determines the amount an individual earns for their labor? What are the benefits associated with attaining a college degree? Is the minimum wage an effective policy tool? Is there convincing evidence of discrimination in the work place? (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course.) **Lecture 3, Credits 3 (Biannual)**

ECON-444 **Public Finance**
Public Finance is the study of the microeconomics of the public sector. The course fosters better understanding of the scale, scope and results of government spending and taxes. The focus is on economic efficiency in resource allocation and fairness in the distribution of income and wealth. (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course.) **Lecture 3, Credits 3 (Biannual)**

ECON-445 **History of Economic Thought**
A survey of the various schools of thought that have developed in economics from Aristotle to the present. Representative economists from each of the major schools (Pre-Classical, Classical, Marxian, Neo-Classical, Keynesian, Monetarist, etc.) are studied. (Prerequisites: (ECON-101 or completion of one (1) 400 or 500 level ECON course) and ECON-201 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

ECON-448 **Development Economics**
This course provides an introduction to development economics, which focuses on the problems and challenges faced typically but not exclusively by the developing countries. In this course we will study the economic transformation of developing countries by focusing on the characteristics of land, labor and credit markets in rural areas of developing countries. We will survey the large literature on modeling economic growth and discuss relevant case studies from developing countries. (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course.) **Lecture 3, Credits 3 (Fall)**

ECON-449 **Comparative Economic Systems**
This course mainly involves a comparative analysis of the structure and performance of different economic systems. The two major economic systems studied are market capitalism and command socialism. In the first part of the course, students are introduced to the economic decision-making processes in the two systems, including the economic structure, operation and relative efficiency in achieving its macroeconomic goals. In the second part, several examples from the world economy which lie on a spectrum between pure market and pure command systems are comparatively discussed and evaluated. (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course.) **Lecture 3, Credits 3 (Biannual)**

ECON-450 **Health Care Economics**
Examines the economics of health care, the organization of its delivery and financing, and analyzes access to care issues, the role of insurance, the regulation of hospitals, physicians, and the drug industry, the role of technology, and limits on health care spending. (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course.) **Lecture 3, Credits 3 (Spring)**

ECON-451 **Economics of Women and the Family**
Women make choices concerning marriage, fertility and labor market participation on the basis of many factors, including government policies targeting those decisions. This course uses economic theory and empirical research in order to describe the changing demographic profile of families, poverty, and the labor force and to explore how economic theory and practice fit into the larger social science goals of describing human behavior by focusing on women and on the family. (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course.) **Lecture 3, Credits 3 (Fall, Summer)**

ECON-452 **Economics of Native America**
This course will analyze current and historic economic issues faced by Native Americans. It will also examine government policies enacted by and directed toward Native Americans with a focus on their economic implications. This will be done using standard economic models of the labor market, poverty, trade, development, and gaming. (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course.) **Lecture 3, Credits 3 (Fall or Spring)**

ECON-453 **Behavioral and Experimental Economics**
Over the past few decades, Experimental and Behavioral Economics have become two of the fastest growing and exciting fields of economics. This course will provide students with an introduction to many interesting concepts in both fields. In doing so, students will learn how experimental methodology can be used to provide insights about economic behavior in the areas of market exchange and strategic decision making. Additionally, students will be exposed to interesting topics in Behavioral Economics including: biases and heuristics, decisions under risk and uncertainty, inter-temporal choice, social preferences, bounded rationality, and learning. The concepts and methods covered in this course will be primarily illustrated by presenting recent experimental and theoretical studies, running in-class experiments, and by participating in group projects. (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course.) **Lecture 3, Credits 3 (Fall)**

ECON-499 **Economics Co-op**
Students will have an opportunity to gain one semester of work experience in a professional setting related to the economics major. Department approval is required. (This course is restricted to ECON-BS Major students.) **CO OP, Credits 0 (Fall, Spring, Summer)**

ECON-501 **Directed Research in Economics**
This course is designed to allow economics students to pursue research under the direction of an economics faculty mentor. Prior to enrollment in this course the student must submit a research proposal to the proposed faculty sponsor and the economics department for approval. Once approved, the faculty sponsor in consultation with the student will determine the number of credit hours (1-3) which will be assigned for the course. The completed research project will be presented at the annual COLA Undergraduate Research Conference. (This course is restricted to ECON-BS Major students.) **Ind Study, Credits 1 - 3**

ECON-502 **Honors Economic Independent Research**
This course is designed to allow economics students who are in the Honors Program to conduct independent research under the guidance of a faculty mentor. Prior to enrollment in this course the student must submit a research proposal and the name of the proposed faculty mentor to the economics department for approval. Once approved, the faculty mentor in consultation with the student will determine the number of credit hours which will be assigned to the course. The completed research project will be presented at the annual Economics/Public Policy Undergraduate Research Conference. (This course is restricted to ECON-BS Major students.) **Ind Study, Credits 1 - 3**

ECON-503 **Econometrics II**
Econometrics II builds on skills in applied regression analysis by exploring advanced regression estimation topics including panel data estimation, Instrumental Variable and Two-Stage-Least-Squares estimation, simultaneous equation models, limited dependent variable models, and advanced time series topics. (Prerequisites: ECON-403 or equivalent course.) **Lecture 3, Credits 3 (Biannual)**

ECON-510**Economics Capstone Experience**

This course registers the student's completion of the capstone experience required for economics majors. The requirement can be fulfilled by either presenting a class paper at an approved on-campus or off-campus research conference or submitting a solo-authored or co-authored research paper to a peer-reviewed journal. Economics students experience conducting research and presenting their findings before an audience of their peers and professionals in the field. Students are sponsored by a faculty member, developing their pre-professional skills while learning how to do research first hand. Double-majors who satisfactorily complete a capstone experience in their primary major automatically fulfill the economics capstone experience requirement. (This class is restricted to students with at least 2nd year standing in ECON-BS.) **Research, Credits 0 (Fall, Spring, Summer)**

ECON-520**Environmental Economics**

This course examines the relationship and apparent conflict between economic growth and environmental quality, the economics of environmental issues and policy, the environment as a resource and a public good, and the ability and lack of ability of free markets and the government to deal adequately with pollution and other environmental problems. (Prerequisites: ECON-101 or completion of one (1) 400 or 500 level ECON course.) **Lecture 3, Credits 3 (Spring)**

English**ENGL-101****English Studies**

This course will introduce students to the field of English Studies and the kinds of reading, writing, and critical thinking practices central to the field today. English Studies, consolidated as a field in the 19th century in European and American Universities, has evolved well beyond its initial focus on English-language literatures, language practices, and socio-linguistic concerns while retaining its primary concern with literature, language-arts, linguistics, rhetorical practices, and their participation in broader national and global cultures and subcultures. **Lecture 1, Credits 1 (Annual)**

ENGL-150**FYW: Future of Writing**

This First Year Writing Intensive course is designed to develop first-year students' proficiency in analytical writing, rhetorical reading, and critical thinking by focusing on particular uses of narrative. Students will read, understand, and interpret a variety of texts representing different cultural perspectives and/or academic disciplines. Increasingly, scholars, artists, public figures and other professionals recognize the value of using stories across genres to inform analytical practice. Students will gain informed practice in using narrative in different disciplines, and become aware of storytelling as one among a number of rhetorical strategies for inquiry. Students will be expected to give presentations as well as write papers both in response to the reading material and in services of their own independent arguments. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

ENGL-150H**FYW: Future of Writing**

The Honors Writing Seminar is a three-credit seminar limited to 16 students per section. The course is designed to develop first-year students' proficiency in analytical writing, rhetorical reading, and critical thinking. Students will read, understand, and interpret a variety of texts representing different cultural perspectives and/or academic disciplines. Academic, non-fiction texts, chosen around a particular theme, are designed to challenge students intellectually and to stimulate their writing for a variety of contexts and purposes. Through inquiry-based assignment sequences, students will develop academic research and literacy practices that will be further strengthened throughout their academic careers. Particular attention will be given to the writing process, including an emphasis on teacher-student conferencing, self-assessment, class discussion, peer review, formal and informal writing, research, and revision; small class size promotes frequent student-instructor and student-student interaction. The course also emphasizes the principles of intellectual property and academic honesty for both current academic and future professional writing. (Honors Students) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

ENGL-210**Literature and Cultural Studies**

In this course, students will study literature, movements, and writers within their cultural contexts and in relation to modes of literary production and circulation. Students will hone their skills as attentive readers and will engage with literary analysis and cultural criticism. The class will incorporate various literary, cultural, and interdisciplinary theories—such as psychoanalytic theory, feminist and queer theories, critical race studies, and postcolonial theory. Using these theoretical frameworks in order to study texts, students will gain a strong foundation for analyzing the ways literary language functions and exploring the interrelations among literature, culture, and history. In doing so, they will engage issues involving culture, identity, language, ethics, race, gender, class, and globalism, among many others. **Lecture 3, Credits 3 (Fall, Spring)**

ENGL-211**Introduction to Creative Writing: Prose and Poetry**

Introduction to Creative Writing is designed to guide students into the craft of creative non-fiction and fiction prose or poetry. The primary goal is to experiment with various forms of creative writing and to produce at least one polished work. The course uses peer feedback and workshops in the development of creative writing projects. **Lecture 3, Credits 3 (Fall, Spring)**

ENGL-212**Introduction to Creative Writing: Forms and Styles**

Creative writing in the 21st century is no longer bound to the printed page; it exists in many forms, across many media. This course introduces students to multi-media creative writing through generative writing techniques, specifically focusing on language as the basic building block of writing. Exercises in reading, writing, workshop, and revision will teach students techniques to manipulate language, construct narrative through non-linear approaches, and generate ideas for particular media through linguistic play. Students will learn elements of craft specific to particular forms and media. Class workshops will provide the opportunity to give and receive feedback as well as participate in collaborative creation. Students will produce creative work for digital and location-based distribution as well as for live performance, therefore highlighting the diversity of physical and virtual media where 21st-century creative writing takes place. **Lecture 3, Credits 3 (Fall, Spring)**

ENGL-214**Introduction to Linguistics**

This course introduces students to the study of English language and linguistics, considering the context of the USA and English in the global society. Students will discover and apply analytical thinking in linguistics by examining the English language system. In that process, students will study principles and concepts of linguistics as a scientific discipline as they experience applying and critically comparing a range of practical methods and tools used in current linguistic analysis, including in laboratory work. Students will also understand the impact of English linguistics on other disciplines in English studies. In case-based inquiry and problem solving, students will explore the forms and functions of English in comparison with an artificial or constructed language from fiction, the film industry, or another context. **Lecture 3, Credits 3 (Fall)**

ENGL-215**Text and Code**

We encounter digital texts and codes every time we use a smart phone, turn on an app, read an e-book, or interact online. This course examines the innovative combinations of text and code that underpin emerging textual practices such as electronic literatures, digital games, mobile communication, geospatial mapping, interactive and locative media, augmented reality, and interactive museum design. Drawing on key concepts of text and code in related fields, students will analyze shifting expressive textual practices and develop the literacies necessary to read and understand them. Practicing and reflecting on such new media literacies, the course explores their social, cultural, creative, technological, and legal significance. To encourage multiple perspectives on these pivotal concepts of text and code and their import, the course includes guest lectures by scholars and practitioners in these fields. **Lecture 3, Credits 3 (Fall)**

ENGL-250**Data Methods for English Majors**

Designed for English majors, this course provides an introduction to methods used to analyze, interpret, and visualize textual data. Students will learn how to formulate research questions, collect relevant data, and disseminate findings. Students across tracks will leave the course with a toolbox of approaches for applied work as well as critical understanding of methodological and ethical considerations of working with textual data. **Lecture 3, Credits 3 (Spring)**

ENGL-275**Storytelling: [Genre/Theme]**

In this course students will focus on reading and analyzing storytelling as a literary practice. It introduces the basic elements of narrative and story, acknowledging these as a primary way that we organize information and communicate our experiences, whether in fictional or real-world domains. The course explores defining characters of narrative expression and storytelling: story arcs, conflict, transformation, plot, and structural relationships among characters and also between author, text, and audience/reader. Exploring influential commentary on "story" and considering significant differences between oral, print, and digital storytelling methods, the course invites students to consider how the foundations of storytelling have evolved over time, and how new techniques continue to emerge in the present day. **Lecture 3, Credits 3 (Fall)**

ENGL-301**The Art of Poetry**

This course emphasizes the enjoyment and study of poetry with primary attention to major poetry in English. Students will develop (and apply) a working vocabulary of the concepts and terminology used to discuss and analyze poetry, through close readings of individual poems, lectures on specific poets, and theories of poetics. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

ENGL-302**The Short Story**

The short story has been one of the most dynamic and innovative genres in literature. This course uses the genre of the short story to provide material for critical commentary and cultural understanding. Students read a variety of short stories to develop an understanding of the form and its impact on culture. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

ENGL-304

Drama and Theatre

From Oedipus Rex to Hamlet dramatic characters have come to represent human archetypes for millennia. Drama captures both current sociological trends and the universal everyman. In this course students will explore the literary elements that comprise the genre of Drama. Drama is the only literary art that requires an extra step to come to full expression. Playwrights, unlike the novelists or poets, create their work to be performed by others. In this course, students will read a selection of plays and discuss questions of historical relevance, reception, and ask why this form of literature has been so enduring and socially potent. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

ENGL-307

Mythology and Literature

This course is a scholarly investigation into the cultural, historical, social, psychological, religious and spiritual, literary and performative dimensions of world myth. It examines different approaches to the study of myth emerging from disciplines such as anthropology, history, literary studies, and psychology. Special attention will be paid to the effects of these narratives on literature and other kinds of cultural texts, past and present. We will also use myth to develop, and critically reflect on, comparative approaches to world cultures. **Lecture 3, Credits 3 (Spring)**

ENGL-308

Shakespeare Drama

In this course students will read, study, and discuss some of Shakespeare's dramatic work in an attempt to determine the nature of his significance. What political and institutional factors account for the reverence accorded to Shakespeare? In addition to reading a range of Shakespeare's plays, the course will develop deeper understandings of contemporary literary theory and practices that allow various interpretations of these plays. The approach will be comparative and reflect on the influence and effect of Shakespeare's work on contemporary culture. Attention will be paid to issues of gender, historicity, iconicity and textual analysis among others **Lecture 3, Credits 3 (Spring)**

ENGL-309

Topics in Literary Forms

This course explores the evolution of an influential literary form (the short story, drama, poetry, autobiographical literature, or the novel). Reading a series of variations on this literary form, likely bridging cultural or historical contexts or themes, the course develops critical perspectives and artistic insights into this genre of writing. Criticism and theory appropriate to the genre will be discussed as a way to understand the form, its social functions, and its cultural and political significance. The course can be taken up to two times, for a total of 6 semester credit hours, as long as the topics are different. **Lecture 3, Credits 3 (Spring)**

ENGL-310

Introduction to Language Science

This course introduces the basic concepts of linguistics, which is the scientific study of human languages. Students will be introduced to core linguistic disciplines (phonetics, phonology, morphology, syntax, semantics, and pragmatics) and to principles of linguistics through discussion and the analysis of a wide range of linguistic data based on current linguistic models. English will often serve as the reference language, but we will discuss a wide variety of languages, including sign languages, to illustrate core concepts in linguistics. The course will have relevance to other disciplines in the humanities, sciences, and technical fields. Students will be encouraged to develop critical thinking regarding the study of human languages through discussions of the origins of languages, how languages are acquired, their organization in the brain, and languages' socio-cultural roles. Some other topics that will be introduced are: language globalization and language endangerment, language and computers, and forensic linguistics. **Lecture 3, Credits 3 (Fall)**

ENGL-312

American Literature

This course presents a study of American literature by engaging in critically informed analysis of texts that emerged from within the geography, history, and cultures that constitute the modern United States. This includes work by colonial writers, Native American writers, African American writers, and writers from the many other ethnic and racial groups who have immigrated to and comprised the fabric of American culture. One of the goals of the class is to analyze and discuss the works in their respective socio-historical contexts, with a special focus on the ways in which individual works belong to a distinctly American literary tradition. Specific literary works studied will vary depending on the instructor. The course can be repeated up to 2 times, for 6 semester credit hours, as long as the topics are different. **Lecture 3, Credits 3 (Annual)**

ENGL-313

British Literature

This course presents a study of British literature by engaging in critically informed analysis of texts that emerged from within the geography, history, and cultures that constitute the modern United Kingdom. This includes work by writers from all parts of the British Isles (England, Wales, Scotland, Ireland) and writers from Britain's vast global empire. One of the goals of the class is to analyze and discuss the works in their respective socio-historical contexts, with a special focus on the ways in which individual works belong to a distinctly British literary tradition. Specific literary works studied will vary depending on the instructor. The course can be repeated up to 2 times, for 6 semester credit hours, as long as the topics are different. **Lecture 3, Credits 3 (Annual)**

ENGL-314

Ethics in the Graphic Memoir

Graphic novels demonstrate a concern for constructed narrative within a visual structure, character development, and plot strategies. Graphic memoirs, or auto-graphic novels, tell true tales of human experiences and global events, exploring the boundaries between fact and fiction, public and private, interior and exterior, visual and textual, seen and unseen, traumatic pasts and their futures. Graphic memoirs are interested in how these distinctions, and the questions of individual and collective truth, transparency, and communicability they open onto, help to delineate ethical behavior and belief systems. Holding a mirror up to the multiple ways in which contemporary cultures frame and reframe individual and collective experience, graphic memoirs render their subjects' and cultures' ethical premises and guidelines explicit, and, therefore, enable readers to revisit, rethink, and redraw accepted ways of behaving, understanding, and circulating. Texts used in this course will be explored through this lens. We will focus on the ethical considerations and concerns conveyed in and by graphic memoirs in order to uncover unique forms of book-length sequential art, as well as enhance critical thinking about ethics and media literacy skills. Designated as writing intensive, this course emphasizes writing practices, recognizing the role writing plays in the formation of knowledge, and the framing of a specific academic specialization, as well as genre. **Lecture 3, Credits 3 (Spring)**

ENGL-315

Digital Literature

Since the initial development of the computer, writers have collaborated with programmers, illustrators, and soundscapists to create digital literatures. Following from radical techniques in print literatures such as concrete poetry, Choose Your Own Adventure novels, and reorderable/unbound fictions, digital literatures exploit the potential of digital formats to explore questions of interactivity, readership, authorship, embodiment, and power. In this class, we will learn to analyze and appreciate digital literatures not simply through their content, but also through the relation of content to form, media, programming platforms, and distribution formats. Our consideration of digital literatures will lead us to cell phones, web pages, video games, virtual reality environments, and genome sequencers. **Lecture 3, Credits 3 (Fall)**

ENGL-316

Global Literature

This course presents a study of global literature by engaging in critically informed analysis of texts from different geographical regions or cultural perspectives. Students will discover new modes for thinking about what global literature is, and how globalizing impulses have changed and shaped our world. One of the goals of the class is to analyze and discuss the works in their respective socio-historical contexts, with a special focus on the theme of encounter or contact zones. The impact of various factors such as migration, nationality, class, race, gender, generation, and religion will also be taken into consideration. The course can be repeated up to two times, for 6 semester credit hours, as long as the topics are different. **Lecture 3, Credits 3 (Spring)**

ENGL-318

Popular Literature

This course examines popular literature, a designation that has meant different things at different times and that has included literature as diverse as Shakespearean comedies, Gothic fiction, Science Fiction, and Fantasy. In part, students will consider the artistic relationships between popular literature and both historical and contemporary literary forms in order to understand how popular literature draws upon and sometimes invents new kinds of artistic representation. The class will also ask students to explore what social attitudes and pressures help to make a form popular at a particular moment in time, and how popularity is often driven by the social networks of book production, marketing, sales, and adaptation. Different sections may focus on different popular literary forms. Whatever the topic, the course will provide students a lens through which to discuss how the public, mainstream authors, and literary critics, as well as editors and publishers, impact the development of literary traditions. **Lecture 3, Credits 3 (Annual)**

ENGL-320

Genre Fiction

Students will learn about foundational texts in one or more category of genre fiction and review its development in the 19th, 20th, and/or 21st centuries. Genre is a category characterized by similarities in style, or subject matter. Examples include science fiction, fantasy, speculative fiction, fanfiction, magical realism, or historical fiction. The course approaches genre fiction as literary form, as cultural artifact, and as philosophical speculation; students will learn to distinguish key features of genre fiction, including the historical inspiration as well as contemporary trends. The course may be taken up to two times for a total of 6 credit hours, as long as the topics are different. **Lecture 3, Credits 3 (Fall)**

ENGL-322**Literary Geographies**

The course uses both literature and geography, artful writing and creative mapping, to explore both fictional and real places. From Sherlock Holmes's 221B Baker St. London and Charles Dickens's 19th century London to J. R. R. Tolkien's Middle Earth and Ursula Le Guin's Earthsea, geography is more than an artistic theme, and maps are more than creative illustrations. Literary geography explores the ways in which authors work with detail not only to create setting but to depict geographical locations. The course will challenge students to understand "landscape" as a more than a backdrop. Throughout the semester we will engage with the socio-cultural notions of "place": home and community, borderlands and human migration, smart cities and mundane landscapes, territory and tourism. Students may practice plotting authors and their works, following the routes characters take across a landscape, or making the geography of imaginary worlds visible. **Lecture 3, Credits 3 (Spring)**

ENGL-325H**Honors English**

A critical examination of themes, topics, theories and practices in a literary or writing studies area associated with existing courses in the English curriculum, or with a special topics area. The approach to this literary or writing studies topic will be specially geared to honors students and others who wish to participate in a more in-depth and rigorous exploration of a literary or writing set of topics. (Honors Students) **Lecture 3, Credits 3 (Fall)**

ENGL-328**Rhetoric of Science**

Exploration of the many ways in which science employs modes of persuasion, and the ways it does so differently in different cases of scientific work. Emphasis will be given to the conjunction between science and rhetoric; examples will be drawn from key figures and texts in the history of science, ongoing controversies in contemporary scientific debates, the popularization of science in public media, and the representation of science in fiction. **Lecture 3, Credits 3 (Spring, Summer)**

ENGL-333**The Rhetoric of Terrorism**

This class examines the history of terrorism (both the concept and the term), definitions of terrorism and attempts to explain the root causes of terrorism through rhetorical and ethical analysis of narratives written by historians, journalists, and terrorists themselves. Students will read and discuss charters, manifestoes and messages (terrorism texts) of domestic and foreign, regional and global, non-state entities motivated by politics or religion to commit violence, as well as the efforts of analysts to explain and contextualize their activities. **Lecture 3, Credits 3 (Fall)**

ENGL-343**Global Deaf Literature**

This literature course explores the deaf elements in select literary works by deaf authors and hearing authors from different societies around the world representing various literary periods and movements. This course begins with the study of ancient writings and laws about Deaf people, documenting beliefs and values of earliest civilizations about Deaf people. Deaf culture in world literature is largely described by preconceived notions and physiognomic descriptions of Deaf people. Stories throughout world history are also characterized by varied responses to emerging educational approaches. Significant advances in medicine, science, and technology in the 19th century changed conceptions of the moral and cultural values imposed on Deaf people by hearing societies. This concept is explored through various literary lenses. The course considers global literary tradition for new interpretations of Deaf experiences. **Lecture 3, Credits 3 (Spring, Summer)**

ENGL-345**History of Madness**

This course will study the changes in definitions, explanations, and depictions of madness as expressed in psychiatric texts, asylum records, novelists, cartoonists, artists, photographers, filmmakers—and patient narratives. Certainly, madness has assumed many names and forms: the sacred disease, frenzy, hysteria, mania, melancholy, neurosis, dementia, praecox, schizophrenia, phobia, post-traumatic stress disorder. Those afflicted have been admired, pitied, mocked, hidden from public view, imprisoned, restrained, operated on, hospitalized, counseled, analyzed, and medicated. The brain, particularly the disordered brain, has long been a source of interest. This course explores the brain from the history of madness. The course takes a humanist, rhetorical, and historicist approach to the question of madness within changing social institutions and popular discourse. **Lecture 3, Credits 3 (Fall)**

ENGL-345H**History of Madness**

This course will study the changes in definitions, explanations, and depictions of madness as expressed in psychiatric texts, asylum records, novelists, cartoonists, artists, photographers, film-makers—and patient narratives. Certainly, madness has assumed many names and forms: the sacred disease, frenzy, hysteria, mania, melancholy, neurosis, dementia, praecox, schizophrenia, phobia, post-traumatic stress disorder. Those afflicted have been admired, pitied, mocked, hidden from public view, imprisoned, restrained, operated on, hospitalized, counseled, analyzed, and medicated. The brain has long been a source of interest, particularly the disordered brain. This course explores the brain from the history of madness. The course takes a humanist, rhetorical, and historicist approach to the question of madness within changing social institutions and popular discourse. (This class is restricted to students in the Honors program.) **Lecture 3, Credits 3 (Fall)**

ENGL-351**Language Technology**

We will explore the relationship between language and technology from the invention of writing systems to current natural language and speech technologies. Topics include script decipherment, machine translation, automatic speech recognition and generation, dialog systems, computational natural language understanding and inference, as well as language technologies that support users with language disabilities. We will also trace how science and technology are shaping language, discuss relevant artificial intelligence concepts, and examine the ethical implications of advances in language processing by computers. Students will have the opportunity to experience text analysis with relevant tools. This is an interdisciplinary course and technical background is not required. **Lecture 4, Credits 3 (Spring)**

ENGL-353**Fantasy**

This course provides a selective survey of fantasy from its antecedents in mythology, legend, and folklore through its transformation through the 20th and 21st centuries. Topics may include the development of the genre's roots in mythology, the epic, and medieval Romance, and folklore as well as diverse contemporary forms such as high fantasy, magical realism, urban fantasy, new wave fabulism, and slipstream. **Lecture 3, Credits 3 (Fall)**

ENGL-356**Meaning in Language**

In this course, students will learn about linguistic methods for characterizing meaning considering words, sentences, conversation, and language in situational contexts. The class will examine these topics in English and across languages and cultures, studying different linguistic frameworks for describing meaning, including debates among them. We will explore the link between verbal and non-verbal semantics, and apply systematic meaning description and analysis to literary production, advertising, clinical interactions, entertainment, and digital media discourse. **Lecture 3, Credits 3 (Biannual)**

ENGL-360**Written Argument**

This course will focus on academic writing specifically, the arguments presented in different fields and professions about issues of significance. Students will learn about the rhetorical, ethical, emotional, historical and logical elements of persuasion as they relate to written and visual arguments and they will practice making claims, providing evidence, exploring underlying assumptions and anticipating counter-arguments as they relate to different audiences. In addition to argument analyses, students will develop arguments of their own through inquiry-based essays. **Lecture 3, Credits 3 (Fall, Spring)**

ENGL-361**Technical Writing**

Provides knowledge of and practice in technical writing. Key topics include audience analysis; organizing, preparing and revising short and long technical documents; designing documents using effective design features and principles, and formatting elements using tables and graphs; conducting research; writing technical definitions, and physical and process descriptions; writing instructions; and individual and group peer editing. **Lecture 3, Credits 3 (Fall, Spring)**

ENGL-370**Evolving English Language**

What makes the English language so difficult? Where do our words come from? Why does Old English look like a foreign language? This course surveys the development of the English language from its beginning to the present to answer such questions as these. Designed for anyone who is curious about the history and periods of the English language or the nature of language change. **Lecture 3, Credits 3 (Spring)**

ENGL-373**Media Adaptation**

This course introduces students to the field of adaptation studies and explores the changes that occur as particular texts such as print, radio, theatre, television, film, and videogames move between various cultural forms and amongst different cultural contexts. The course focuses upon works that have been disseminated in more than one medium. **Lecture 3, Credits 3 (Fall)**

ENGL-374**Games and Literature**

Who studies game studies? Writing in games can often be hit or miss, so relying on an established story can provide support and allows the medium to evolve to cover more interesting stories than the typical mass-offering affairs. Still, literature and games are fundamentally different media—and as such these differences must be accounted for when mapping literature onto video games. Will game studies ever be as highly regarded as is critical scholarship on, say, literature? Can a video game possess substantial literary merit? Can a video game offer the same depth of characters and insight into the human condition as a novel? Do video games invite the player to do the same things that works of great literature invite the reader to do: identify with the characters, invite him to judge them and quarrel with them, and to experience their joys and sufferings as the reader's own? In this course we will have these conversations and then go beyond. We will examine works that have visually evocative and varied settings; narratives that make readers wonder what is going to happen next; and a rapidly changing culture that prompts even more questions than it answers. **Lecture 3, Credits 3 (Fall)**

ENGL-375

Storytelling Across Media

This course introduces the basic elements of narrative, reflecting on key concepts in narrative theory such as – story and plot, narration and focalization, characterization, storyspace, and worldmaking – to enhance your understanding of how stories work and your ability to understand how such storytelling strategies convey their meaning and themes. After an initial exploration of storytelling traditions emerging from oral myth and short stories in print, we expand our inquiries into what a narrative is and what it can do by considering what happens to storytelling in graphic novels, digital games, and in recent electronic literature. Reflecting on competing definitions and varieties of narrative, the course raises the overarching question of why how we access, read, write, and circulate stories as a culture matters. Expect to read stories in a variety of media, to review basic concepts and conversations drawn from narrative theory, and to creatively experiment with the storytelling strategies we are analyzing in class. No familiarity with specific print, digital, or visual media necessary, though a willingness to read and reflect on stories in various media and to analyze their cultural significance will be essential. **Lecture 3, Credits 3 (Spring)**

ENGL-376

Experimental Writing

Is it true that literature makes nothing happen? Experimental writing is built on the opposite assumption! This course introduces students to innovative texts that challenge our usual ways of thinking about the relationship of language to the world: the cultural contexts within which language functions, the conflicts out of which it arises, the aesthetic pleasures with which it is associated, and the purposes – intentional or other – which it serves. Writing experiments can test boundaries and break limits, offering us ways to reconsider and redefine our own experience – social, intellectual, emotional, spiritual. Moving from magic to modernity, from monster to machine, we will explore the transformative power of experimental writing. Students are expected to post weekly responses to the readings in Discussions on MyCourses, work with a group to research and prepare a class presentation on a significant experimental writer, and submit a final paper on a theme to be announced. Expect reading quizzes and a take-home final exam. (Prerequisites: ENGL-211 or completion of First Year Writing (FYW) requirement or equivalent course.) **Lecture 4, Credits 3 (Spring)**

ENGL-377

Transmedia Storyworlds

A transmedia storyworld is a shared universe in which its settings, characters, objects, events, and histories are featured in one or more narratives across many different media, including print fiction, films, television episodes, comics/ graphic novels, and games. This course will focus on the construction of large-scale transmedia storyworlds and how such storyworlds expand in size and detail over time. Students will trace narrative arcs as deployed through different media and consider the strengths and limitations of each medium in terms of adding to knowledge about the transmedia storyworld. The course will also analyze the differences and similarities between transmedia narratives, adaptation, and other forms of serial storytelling; the multi-authored nature of transmedia storyworlds; commercial aspects of transmedia storyworlds; and creative work produced by and for fan communities. **Lecture 3, Credits 3 (Fall)**

ENGL-381

Science Writing

Study of and practice in writing about science, environment, medicine and technology for audiences ranging from the general public to scientists and engineers. Starts with basic science writing for lay audiences, emphasizing writing strategies and techniques. Also explores problems of conveying highly complex technical information to multiple audiences, factors that influence science communication to the public, and interactions between scientists and journalists. The course examines new opportunities for covering science (especially on the internet), important ethical and practical constraints that govern the reporting of scientific information, and the cultural place of science in our society. **Lecture 3, Credits 3 (Annual)**

ENGL-386

World Building Workshop

This course focuses on the collaboration construction of fictional worlds. Students will learn to think critically about features of fictional worlds, such as the social, political, and economic structures that influence daily life for the characters who inhabit that world. Students will also participate in extensive character development exercises, and then write short fiction from these characters' perspectives describing the challenges they face in these worlds. Students will critique each other's fiction and submit revised work. Each class will include considerations of sophisticated fictional worlds in print and in other media and discuss world building features relevant to teach. (Prerequisites: ENGL-211 or completion of First Year Writing (FYW) requirement or equivalent course.) **Lecture 3, Credits 3 (Fall)**

ENGL-389

Digital Creative Writing Workshop

Digital creative writing involves much more than simply writing in digital formats - it can include computer-generated poetry, bots, hypertext fiction, Augmented Reality, or locative narrative. This course is for students who want to explore digital creative writing in all its forms. Through reading, discussion, and exercises, students will produce born digital writings in different applications. Students will learn style and craft techniques for digital environments while also exploring the relationship between content and digital applications. Peer critiques will help students rethink their work and become better editors. Programming knowledge is helpful but not required. This course can be taken up to two times for a total of six semester credit hours as long as the instructors are different. (Prerequisites: ENGL-211 or completion of First Year Writing (FYW) requirement or equivalent course.) **Lecture 3, Credits 3 (Spring)**

ENGL-390

Creative Writing Workshop

This course is for students who want to explore the techniques of a single genre of creative writing and add to their skills as a creative writer. Through reading and discussion, students will see their own writing in a larger context. Reading/reflection and writing/revision will be emphasized all semester. The focus will be on the creation of creative works and the learning of stylistic and craft techniques. Ongoing work will be discussed with peer editors, which will not only help students rethink their work but teach them to become better editors. Group critiques will provide the opportunity to give and receive helpful feedback. Each class will rely extensively on the creative writing workshop model, and will focus on a specific genre of print-based creative writing. The course may be taken up to three times for a total of 9 credit hours, as long as the topics are different. (Prerequisites: ENGL-211 or completion of First Year Writing (FYW) requirement or equivalent course.) **Lecture 3, Credits 3 (Fall)**

ENGL-391

Dangerous Texts

This course will examine how suppression of information has been orchestrated throughout history in different contexts. The process of suppressing information –of people in power attempting to hide images, sounds and words– must itself be viewed in perspective. We must recognize acts of censorship in relation to their social settings, political movements, religious beliefs, cultural expressions and/or personal identities. The texts that we will study were all considered dangerous enough to be banned by governments. They are dangerous because they represent sexuality, race, politics, and religion in ways that challenge the current political/cultural norms of their given culture. What, then, is so dangerous about a fictional representation? What is it that makes a certain work dangerous at a particular time and how does this danger manifest itself in stories, novels (print and graphic), and poetry? Studying these dangerous texts and watching some dangerous films we will ask: what features of political and cultural regimes do artists tend to single out for criticism? What is the range of expressive tools they use, including the contemporary context of digital media? What is it that makes intellectuals in general and imaginative writers in particular so potent a threat to established power? Do issues like these matter only in totalitarian regimes, or can we learn something about the book-banning pressures in our own society? How do social media technologies complicate discussions of censorship and creativity? **Lecture 3, Credits 3 (Fall)**

ENGL-400

Literary and Cultural Studies

A focused, in depth study and analysis of a selected topic in literary and/or cultural studies. Specific topics vary according to faculty assigned. (Prerequisites: Completion of First Year Writing (FYW) requirement is required prior to enrolling in this class.) **Lecture 3, Credits 3 (Fall, Summer)**

ENGL-410

Film Studies

This course familiarizes students with a number of different critical approaches to film as a narrative and representational art. The course introduces students to the language as well as analytical and critical methodologies of film theory and criticism from early formalist approaches to contemporary considerations of technologies and ideologies alike. Students will be introduced to a selection of these approaches and be asked to apply them to a variety of films selected by the instructor. Additional screening time is recommended. (Prerequisites: Completion of First Year Writing (FYW) requirement is required prior to enrolling in this class.) **Lecture 3, Credits 3 (Spring)**

ENGL-411

Themes in American Literature

The course introduces students to American literature by tracing a particular theme through a historical survey of canonical, non-canonical, and contemporary novels, stories, poetry, and drama, as well as non-fiction forms (speeches, autobiographies, essays, etc.). Students will gain a broad understanding of American literary trends while also gaining a deep understanding of the given themes. These themes will be broadly conceived, but will also lend themselves to social, cultural, and political questions. These themes may include but are not limited to horror, gardens and machines, natives and strangers, borders, etc. While these themes deal with abstract or conceptual ideas, they lead to questions about gender, race, ethnicity, empire, and other historical problems in debates over American exceptionalism, empire, and ideology. (Prerequisites: ENGL-210 or completion of First Year Writing (FYW) requirement or equivalent course.) **Lecture 3, Credits 3 (Spring)**

ENGL-413

African-American Literature

Students will explore the landscape of African-American literature, and learn of its development throughout the 19th and/or 20th Centuries. From Phyllis Wheatley, Paul Laurence Dunbar, Ida B. Wells to Toni Morrison, from the Harlem Renaissance, and the Black Arts Movements of the 1960s to Hip-Hop this course will explore African-American writers who inspired a civil rights and cultural revolution. Through writing, reading and research, they will grow to understand how, despite legal limits on freedom and social participation imposed because of their color in American society, blacks created styles of verbal and written expressions unique within the American experience and contributed to the shape, growth and development of the nation's literary character. (Prerequisites: ENGL-150 or completion of First Year Writing (FYW) requirement or equivalent course.) **Lecture 3, Credits 3 (Fall)**

ENGL-414**Women and Gender in Literature and Media**

This variable topic course examines one or more themes, figures, movements, or issues associated with the representation of women and gender in literature and media, and/or associated with the historical, cultural, and theoretical questions provoked by women as producers and consumers of media and texts. The topic for the course is chosen by the instructor, announced in the course subtitle, and developed in the syllabus. The course can be taken multiple times provided that the topic being studied has changed. **Lecture 3, Credits 3 (Fall, Spring)**

ENGL-417**Deaf Literature**

The major focus of this course is on the image of the deaf and the deaf experience as depicted in literature. The course attempts to define deafness and the cultural roles it plays in both texts by deaf authors and texts about deaf persons, as well as to examine particular literary forms related to the deaf experience. Thus, attention is also given to studying ASL poetry. (Prerequisites: Completion of First Year Writing (FYW) requirement is required prior to enrolling in this class.) **Lecture 3, Credits 3 (Spring)**

ENGL-418**Great Authors**

This course provides an in-depth look at literary giants and the masterpieces of prose or poetry they have created; it's an opportunity to see the role they played both within the context of their own time and within the larger span of literary history. These great authors confront key questions of modernity that continue to occupy us to this day; they ask the question of what it means to be human and explore fundamental human themes. They give us a fresh perspective on the past and on ourselves. (Prerequisites: Completion of First Year Writing (FYW) requirement is required prior to enrolling in this class.) **Lecture 3, Credits 3 (Spring)**

ENGL-419**Literature and Technology**

Surveying the rise of computing technologies, information theories, and information economies in the last century, this course considers their impact on literature, culture and knowledge-formation. In particular, we will reflect on topics such as the relations between social and technological transformation, literary print and digital cultures and electronic literature. (Prerequisites: Completion of First Year Writing (FYW) requirement is required prior to enrolling in this class.) **Lecture 3, Credits 3 (Fall)**

ENGL-421**The Graphic Novel**

This course charts the development of the graphic novel, examines that history in relation to other media (including literary works, comics, film, and video games), and reflects on how images and writing function in relation to one another. Primary readings will be supplemented with secondary works that address socio-historical contexts, interpretive approaches and the cultural politics of the medium, such as representations of class, race, gender, and ethnicity. **Lecture 3, Credits 3 (Spring)**

ENGL-422**Maps, Spaces and Places**

This course takes as its premise that spatial thinking is critically important. Spatial thinking informs our ability to understand many areas of 21st century culture, as mobile interfaces and geospatial technologies enable us to engage with our surroundings in new ways. The study begins with the history maps and mapmaking, and explores how maps work. As students create representational, iconographic, satirical, image-based, informational, and other map forms, the course emphasizes the map as narrative. The course develops into an exploration of the ways, particularly in texts, that mapmaking creates cultural routes, mobile forms of ethnography, and ways of imagining travel and tourism in the era of globalization. The diverse writers represented in this course are rethinking space as a dynamic context for the making of history and for different organizations of social and communal life. (Prerequisites: Completion of First Year Writing (FYW) requirement is required prior to enrolling in this class.) **Lecture 3, Credits 3 (Fall)**

ENGL-450**Free and Open Source Culture**

This course charts the development of the free culture movement by examining the changing relationship between authorship and cultural production based on a variety of factors: law, culture, commerce and technology. In particular, we will examine the rise of the concept of the individual author during the last three centuries. Using a variety of historical and theoretical readings, we will note how law and commerce have come to shape the prevailing cultural norms surrounding authorship, while also examining lesser known models of collaborative and distributed authoring practices. This background will inform our study of the rapid social transformations wrought by media technologies in last two centuries, culminating with the challenges and opportunities brought forth by digital media, mobile communications and networked computing. Students will learn about the role of software in highlighting changing authorship practices, facilitating new business and economic models and providing a foundation for conceiving of open source, open access, participatory, peer-to-peer and Free (as in speech, not beer) cultures. (Prerequisites: Completion of First Year Writing (FYW) requirement is required prior to enrolling in this class.) **Lecture 3, Credits 3 (Spring)**

ENGL-472**Special Topics: Writing Studies**

A focused, in depth study of a selected topic in writing. Specific topics vary according to faculty assigned. Topics will vary. **Lecture 3, Credits 3 (Spring)**

ENGL-482**Speech Processing I**

This course introduces students to the fields of experimental phonetics, the scientific study of the sounds used in human speech, and speech processing, the study of the speech signal used in automatic speech recognition, spoken emotion detection, and other technologies. Students will learn about the physiology of speech production and perception, and they will acquire the skills necessary to accurately describe speech concepts and to analyze speech using relevant methods and tools. Turning to speech processing technology, students will explore automatic speech recognition, speech synthesis, speaker identification, and emotion recognition, and learn how our understanding of human speech production and perception informs these technologies. The course will have relevance to other disciplines in the humanities, sciences, and technical fields. This course provides theoretical foundation as well as hands-on laboratory practice. **Lecture 3, Credits 3 (Fall)**

ENGL-490**Advanced Creative Writing Workshop**

This course is for students who want to explore the techniques of a single genre of creative writing and have already completed a creative writing workshop. Through reading and discussion, they will see their own writing in a larger context, culminating in a substantial body of work ready for publication. Reading/reflection and writing/revision will be emphasized all semester. The focus will be on the creation of creative works and the learning of stylistic and craft techniques. Ongoing work will be discussed with peer editors, which will not only help students rethink their work but teach them to become better editors. Group critiques will provide the opportunity to give and receive helpful feedback. Each class will rely extensively on the creative writing workshop model, and will focus on a specific genre of print-based creative writing. The course can be repeated up to three times, for 9 semester credit hours, as long as the topics are different. (Prerequisites: ENGL-386 or ENGL-389 or ENGL-390 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

ENGL-498**English Internship**

A semester or summer-length experience in a professional setting related to the English major, with a minimum of 200 hours; at least 2nd year status and department approval are required. (Prerequisites: This class is restricted to students with at least 2nd year standing.) **Internship, Credits 0 (Fall, Spring, Summer)**

ENGL-499**English Co-op**

A semester or summer-length experience in a professional setting related to the English major, with a minimum of 350 hours. **CO OP, Credits 0 (Fall, Spring, Summer)**

ENGL-500**Capstone in English**

Students will use the capstone as an opportunity to design a project that integrates the knowledge they have gained throughout their English program with experience in the professional track. Students will work with faculty to develop, manage, and execute a project that will culminate in the creation of an academic research paper, analysis of text using digital methods, construction of an argument across media, or demonstration of theoretical and/or aesthetic language use in digital form. Students will work under close mentorship by and/or collaboration with a faculty advisor in the Department of English for project planning. Students will present their project in a venue appropriate to their specific work. (A minimum of 3rd year standing is required to enroll.) **Lecture 3, Credits 3 (Fall, Spring)**

ENGL-510**Transnational Digital Creation Workshop**

The Transnational Digital Creation Workshop is a project-based study abroad experience for students interested in storytelling, digital literature, interactive narrative, digital installation, new media design and technology, human-computer interaction, film, animation, photography, narrative, arts and culture, or global digital cultures. The workshop explores digital writing and transnational collaboration through its methods, its themes, and its practical preparation of students to travel to another country, learning about its official language and culture, as well as prominent digital arts and literary traditions, past and present. The course explores a specific country's cultural and artistic contexts and uses these as the basis for collaborative digital creation projects that students develop with their transnational peers (via videoconferencing, online communication, and through travel to the location to collaborate on-site). The course's transnational research and creation projects provide students with an opportunity to creatively explore themes of global concern, cross-cultural communication, language, and computation-based writing (as the latter is inflected by local and global influences) in one or more ways. This interdisciplinary workshop enables students to put their digital arts, creative writing, literary, and cross-cultural communication skills into practice in new ways, to build their professional portfolio, and to experience working on a cross-cultural team with specific linguistic, cultural, institutional, and site-specific opportunities, challenges, and parameters. **Seminar 3, Credits 3 (Spring, Summer)**

College of Liberal Arts

ENGL-511

Advanced Topics in Creative Writing

This course is for students who have completed a college level writing course creative writing workshop and want to explore in-depth a literary genre or add to their skills as a creative writer whether interested in poetry, fiction, non-fiction, or a combination of genres a specific topic within creative writing. The focus will be on the creation of a significant piece of writing for a final project. In addition to planning and producing a single, sustained creative work, students will complete other exercises and assignments in order to experiment with other genres a variety of writing techniques. Through reading and discussion they will see their own writing in a larger context. Weekly Regular class critiques will provide the opportunity to give and receive helpful feedback. (Prerequisites: ENGL-386 or ENGL-389 or ENGL-390 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

ENGL-543

Game-Based Fiction Workshop

This course is for students who have completed a creative writing workshop and want to explore how games and rules can be used to produce unique and unpredictable narratives. Projects will include individual writing exercises, collaborative writing practice, and critiques of peer writing. Students will examine how different game mechanics produce different kinds of narratives and may be encouraged to develop their own game-based writing projects. Through the reading and discussion of other narrative media, students will learn the affordances and limitations of game-based storytelling systems. (Prerequisites: ENGL-386 or ENGL-389 or ENGL-390 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

ENGL-581

Natural Language Processing I

This course provides theoretical foundation as well as hands-on (lab-style) practice in computational approaches for processing natural language text. The course will have relevance to various disciplines in the humanities, sciences, computational, and technical fields. We will discuss problems that involve different components of the language system (such as meaning in context and linguistic structures). Students will additionally collaborate in teams on modeling and implementing natural language processing and digital text solutions. Students will program in Python and use a variety of relevant tools. Expected: Programming skills, demonstrated via course work or instructor approval. **Lecture 3, Credits 3 (Spring)**

ENGL-582

Natural Language Processing II

Study of a focus area of increased complexity in computational linguistics. The focus varies each semester. Students will develop skills in computational linguistics analysis in a laboratory setting, according to professional standards. A research project plays a central role in the course. Students will engage with relevant research literature, research design and methodology, project development, and reporting in various formats. (Prerequisites: ENGL-581 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

ENGL-584

Speech Processing II

This course introduces students to speech and spoken language processing with a focus on real-world applications including automatic speech recognition, speech synthesis, and spoken dialog systems, as well as tasks such as emotion detection and speaker identification. Students will learn the fundamentals of signal processing for speech and explore the theoretical foundations of how human speech can be processed by computers. Students will then collect data and use existing toolkits to build their own speech recognition or speech synthesis system. This course provides theoretical foundation as well as hands-on laboratory practice. Prerequisite: Programming skills, demonstrated via coursework or instructor approval. (Prerequisite: ENGL-482 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

ENGL-599

Independent Study

A program of study executed by an individual student with assistance and guidance by an instructor, outside a regular classroom setting. Guidelines for designing and gaining approval for an independent study are provided in College of Liberal Arts Policy I.D. **Ind Study, Credits 1 - 6 (Fall, Spring)**

Fine Arts

FNRT-110

Introduction to Music

An introduction to music as a fine art. Students develop skills in listening, evaluation and analysis through an examination of music's forms, constituent elements, and its cultural, stylistic and historical development. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

FNRT-200

Anime

This introductory survey course examines the history, aesthetics and style of Japanese animation or anime. The course provides a vocabulary for the analysis of anime as well as the critical and analytical skills for interpreting anime as an art form. This course will develop students' skills in viewing, analyzing, interpreting and evaluating the art of anime. Students will learn to analyze important series and films, and connect anime with contemporary and historical trends in Japan. Emphasis will be placed on the analysis of works by major directors and studios including: Tezuka, Sugii, Miyazaki, Oshii, Kon, Takahata, Shinkai, Watanabe, Studio Ghibli, Studio 4C, and Madhouse. Background knowledge of animation, film or anime is helpful but no specific knowledge is required or expected. **Lecture 3, Credits 3 (Fall)**

FNRT-201

Music in the US

This course is a survey of music in the United States from the time of European colonization to the present. Particular emphasis is placed upon the question of what makes music distinctively American. **Lecture 3, Credits 3 (Spring)**

FNRT-202

Studies in World Music

A course designed to explore selected music cultures from North America, South America, Africa, India, Asia, East Asia, and Central and Southeastern Europe. The primary goal of the course will be to expand understanding of and perceptions about music both outside and within Western cultural traditions. In addition to class discussions, students will have opportunities for hands-on activities associated with the cultures studied. **Lecture 3, Credits 3 (Fall)**

FNRT-203

American Popular and Rock Music

This course examines the history and elements of popular and rock music in the United States from the end of the 19th century to current times. Emphasis will be placed on the music that was written and performed after WWII. Students will be introduced to various styles of this genre as well as an introduction to those musical elements necessary to define a rudimentary analysis of the music. Among the composers and performers to be studied are early Minstrel performers, Louis Armstrong, Scott Joplin, George Gershwin, Blues musicians, Benny Goodman, Frank Sinatra, R and B musicians, country and western, Elvis Presley, Motown, Ray Charles, folk, Jimi Hendrix, disco, punk, metal, grunge, and pop. **Lecture 3, Credits 3 (Spring)**

FNRT-204

Music and the Stage

A historical and cultural survey of collaboration between the arts of music and theatre, focusing on a selection of significant creative products that combine music and drama. Possible works studied include those by Shakespeare, Monteverdi, Mozart-Daponte, John Gay, Beethoven-Goethe, Wagner, Puccini, Brecht-Weill, and Bernstein, spanning the genres of Renaissance tragedy and comedy, opera seria, opera buffa, ballad opera, incidental music, romantic drama, Italian opera, music-drama, epic theatre, cabaret, vaudeville, and musical comedy. **Lecture 3, Credits 3 (Biannual)**

FNRT-205

Music Theory I

This course is designed for the student who has basic musical literacy (ability to read music notation). In addition to the writing of melody, two-part counterpoint and four-part harmony, some attention will be given to the analysis of form and style. Because it is important that theoretical understanding be coordinated with musical application, time will be devoted to the development of musicianship. Consideration will be given to individual skills and abilities, hopefully allowing for the maximum development of each student. (Elementary music reading ability) **Lecture 3, Credits 3 (Fall)**

FNRT-208

Composing for Media

Composing for Media will guide the student through the process of creating original music to accompany a visual medium. The course begins by focusing on the aesthetics, terminology, procedures, and technical aspects of film scoring. As the course progresses, the skills acquired will progress towards a class project of scoring a short film or animation. By using a broad range of techniques including click tracks, spotting, scoring under dialogue, free timing, and the creative use of overlap cues, students will learn how to develop a dramatic concept for a score and how to synchronize it seamlessly to visual events. This course is applicable to musicians interested in scoring music to visual media as well as students with skills in the areas of audio engineering, film and animation and video gaming. No previous film scoring experience is required. Fundamental knowledge and a background in music will be introduced in the class topics. In addition to a good ear for music, a functional ability with MIDI sequencing, via DAW—a proficiency in the use of sample libraries and audio plug-ins and basic audio mixing—is expected. Entrance to the class requires instructor permission. **Lecture 3, Credits 3 (Fall)**

FNRT-209

Medieval and Renaissance Music

The beginning of the Western tradition of art music can be traced to Medieval Europe ca. 600 CE, as systems of music notation began to develop in and disseminate through important liturgical text sources. This desire to preserve and disseminate certain musical-textual traditions grew and developed steadily throughout Christendom over the next millennium, in both sacred and secular contexts. This course examines this development of music and text during the Medieval and Renaissance periods (ca. 600-1600 CE), with attention drawn to specific aspects of cultural context and performance practices that offer modern musicians and music connoisseurs a solid basis for experiencing the music in live performance, both in active listening (concert/liturgical attendance) and in participating (in-class singing). **Lecture 3, Credits 3 (Biannual)**

FNRT-210

Bach, Handel, and the Baroque

European society experienced many changes during the late 16th through the early 18th centuries, and music's role and development within the context of these changes was varied, and profound. This course explores the creation and performance of music within the context of European cultural, religious, political and artistic ideals from 1580 to 1750, culminating in in-depth discussion of the life and works of J. S. Bach and G. F. Handel. **Lecture 3, Credits 3 (Fall)**

FNRT-211**Era of Haydn, Mozart, and Beethoven**

Many of the characteristics of art music up to the present day have their beginnings in the late 18th century. This course explores the creation and performance of music within the context of European cultural, political and artistic ideals from 1740 to 1825, with particular attention given to the works of Haydn, Mozart, and Beethoven. **Lecture 3, Credits 3 (Spring)**

FNRT-212**Electronic Music Production**

This course explores the composition, arrangement, mixing, and mastering of modern electronic music. Topics include aesthetics of formal song structure and melodic and harmonic construction techniques, synthesis and sound design, using a digital audio workstation (DAW) to program musical elements using audio or MIDI, sound processing using effects such as equalization and compression, and introductory mastering techniques. **Lecture 3, Credits 3 (Spring)**

FNRT-215**Video Game Criticism**

This course will focus on the analysis of video games. Students will play and review classic games from the past as well as important newer games from different genres. Students will explore and discuss the formal and dramatic aspects of video games as works of art: imagery, technique, moral and ethical messages, social commentary, and historical significance. **Lecture 3, Credits 3 (Annual)**

FNRT-220**Introduction to Museums and Collecting**

This course examines the history, theory, ideology, and practice of collecting within the institutional context of the museum. It considers the formation of the modern museum, and focusing on the American context, investigates the function and varieties of museums, ranging from natural history, anthropology, science and technology, history, and art. The course explores the history of the museum and its evolution institutionally, ideologically, and experientially. The course also considers the operations of museums from accessioning through deaccessioning, examining museum management, collections management and collections care. The course also explores museum governance and the professional ethics and legal constraints that affect museum professionals. The course examines how a museum carries out its mission of public education through its collections and exhibitions, as well as through its educational programs and community outreach and visitor studies. Current issues in the museum world are also considered, including: the museum's educational function versus its entertainment function; the problems of staying solvent in an era of diminishing governmental and corporate subsidies; deaccessioning collections to support the museum operations; issues of art theft and repatriation (ranging from colonial era and Nazi era plunder, the disposition of human remains and sacred objects, and illicit trafficking); the evolving responsibilities of the museum to its public and the cultural heritage; and the rise of the virtual museum. Throughout the quarter, the course examines museums and their practices through the perspectives of colonialism, nationalism, class, race, age, gender, and ethnicity. The course includes field trips to local museums and collections throughout the term. **Lecture 3, Credits 3 (Fall)**

FNRT-223**Historic Photographic Processes**

This is a studio-based class in which student recreate a number of different nineteenth century photographic processes. Students will explore the history of photographic technology through use of primary sources and hands on projects. The chemistry and deterioration of the materials will be reviewed through the use of primary texts, projects, and discussion. **Lecture 3, Credits 3 (Spring)**

FNRT-224**History and Theory of Exhibitions**

Art exhibitions are organized around a curatorial premise, a statement that articulates an idea allowing for the selection of work included in an exhibition. This course begins with an overview of exhibition history, starting with the transformation of the Louvre into the first public art museum following the French Revolution, where art history, a discipline developed in the 19th century, was enlisted to organize exhibition. The course then examines the proliferation of types of exhibitions that accompanies modernism, up to the present, paying close attention to the curatorial premise animating the exhibitions. **Lecture 3, Credits 3 (Spring)**

FNRT-250**RIT Singers**

The RIT Singers is an experiential-learning course in which students learn music theory and historical context by learning pieces from the 16th century to the present and performing them at three major concerts a year. Participation in learning and performing such music gives students an experiential appreciation and understanding of the role of music in modern society. In addition, students from the RIT Singers have opportunities to sing in a variety of small vocal ensembles. Auditions will be held to assess proper placement. Contact instructor for more information. (Auditions will be held to assess proper placement. Contact the instructor for information. Students who have previously participated in RIT Singers can enroll without further permission.) **Studio 3, Credits 1 (Fall, Spring)**

FNRT-251**RIT Orchestra**

The RIT Orchestra performs three major concerts a year of standard orchestral repertoire from the 16th century to the present. In addition, students from the RIT Orchestra have the opportunity to play in a variety of chamber music ensembles. Auditions will be held to assess proper placement. Contact instructor for more information. (Auditions will be held to assess proper placement. Contact the instructor for information. Students who have previously participated in RIT Orchestra can enroll without further permission.) **Studio, Credits 1 (Fall, Spring)**

FNRT-252**RIT Concert Band**

The RIT Concert Band is an experiential-learning course in which students learn music theory and historical context by learning several works from the Concert Band literature including standard wind band literature, contemporary compositions, marches, and orchestral transcriptions. The ensemble prepares to perform three major concerts a year and participates in departmental performances. Participation in learning and performing such music gives students an experiential appreciation and understanding of the role of music in modern society. Auditions will be held to assess proper placement. Contact instructor for more information. (Auditions will be held to assess proper placement. Contact the instructor for information. Students who have previously participated in RIT Concert Band can enroll without further permission.) **Studio 1, Credits 1 (Fall, Spring)**

FNRT-253**World Music Ensemble**

The World Music Ensemble is a hands-on course, in which students learn the fundamentals of music as a sociological phenomenon and a variety of concepts and world views to answer the question, What is music? This is accomplished by introducing students to several music cultures, through learning fundamental instrumental and dance techniques, with African music being central to the study. Ensemble is coached four-to-six-times-a-year by professional musicians and dancers, including Ghanaian Master Drummer Martin Kwaku Obeng, and performs several times each school year, both on campus and in the community. Enrollment is open to all interested students, faculty, and staff, regardless of musical proficiency. Developing cooperation and teamwork is a necessary outcome of participation in this ensemble. Auditions will be held to assess proper placement. Contact instructor for more information. (Auditions will be held to assess proper placement. Contact the instructor for information. Students who have previously participated in World Music Ensemble can enroll without further permission.) **Studio 3, Credits 1 (Fall, Spring)**

FNRT-254**RIT Jazz Ensemble**

Preparing for and performing concerts of jazz repertoire offers students the opportunity to broaden their knowledge of and appreciation for music, and its role in society, through the careful analysis of musical forms and ideas, and the comparison of exemplary works from a variety of times, places and social/cultural necessities. The RIT Jazz Ensemble performs three major concerts a year of standard repertoire from the early 20th century to the present. Students from the RIT Jazz Ensemble also have the opportunity to play in a variety of informal performances both on and off campus. Auditions will be held to assess proper placement. Contact instructor for more information. (Auditions will be held to assess proper placement. Contact the instructor for information. Students who have previously participated in RIT Jazz Ensemble can enroll without further permission.) **Studio 3, Credits 1 (Fall, Spring)**

FNRT-255**RIT Chamber Orchestra**

Preparing for and performing concerts of orchestral repertoire offers students the opportunity to broaden their knowledge of and appreciation for music, and its role in society, through the careful analysis of musical forms and ideas, and the comparison of exemplary works from a variety of times, places and social/cultural necessities. The RIT Chamber Orchestra is a select group of advanced players It performs concerts and engages in other activities, in particular the exploration of performing practices and stylistic considerations apropos to 17th, 18th, and 20th century music. In particular, the RIT Chamber Orchestra revives works from the 18th and early 19th centuries that have not been performed in modern times. Participation is by invitation of the music director, or by audition. Contact instructor for more information. (Auditions will be held to assess proper placement. Contact the instructor for information. Students who have previously participated in RIT Chamber Orchestra can enroll without further permission.) **Studio, Credits 1 (Spring)**

FNRT-256**Applied Music**

Students will receive private (one-to-one) instrumental or voice lessons and participate in studio performance opportunities. Private lessons are offered to support the RIT ensembles program, therefore only students who are active participants in an approved RIT ensemble will be eligible for lessons. **Studio 1, Credits 1 (Fall, Spring, Summer)**

FNRT-320**Music of the Romantic Era**

Survey of the rise of romanticism from Beethoven to Strauss in the context of the development of 19th century musical styles in general. Topics of exploration include national trends in 19th century music, the rise of the general public as arbiters of musical taste, philosophical influences, and performance considerations. (Prerequisites: FNRT-110 or FNRT-205 or FNRT-211 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

FNRT-321 **Music Since 1900**
Survey of the cultivated traditions of music in the 20th and 21st centuries, particularly in the U.S., taking into account its political, social, and historical frameworks. (Prerequisites: FNRT-205 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

FNRT-322 **Survey of Jazz**
This course will survey the development of American jazz music, highlighting representative composers and performers and significant works. Particular attention will be drawn to the multi-racial influences on the creation of jazz music and its relationship to American culture as a whole. **Lecture 3, Credits 3 (Fall)**

FNRT-323 **Survey of African-American Music**
This course is a survey of African American music through an examination of the major forms of music-making and dance developed among African Americans in the United States from the early 17th century to the present. A brief introduction to West African cultural characteristics, especially music and dance, as well as discussions of the African diaspora in the New World, will serve as background for this survey. **Lecture 3, Credits 3 (Spring)**

FNRT-324 **Sounds of Protest**
This course is designed to explore the variety of ways music has served as commentary on and/or symbolic representation of social circumstances and events in America and throughout the world, historically and in the present. Students will research, listen to, analyze, and discuss music representing a variety of genres, styles, and cultures, ranging from various forms of European and American folk, popular, and concert music to selected non-western music. Topics will include race, gender, sexuality, economics, class, war, and politics, among others. **Lecture 3, Credits 3 (Spring)**

FNRT-325 **American Popular Song**
This course will survey the development of the American popular song and its composers and performers, taking into account the political, social, and historical perspectives reflected in this commercial part of our vernacular music tradition. **Lecture 3, Credits 3 (Fall)**

FNRT-326 **History and Technology of Musical Instruments**
The development of music in the Western art tradition had a mutually influential relationship with the changes in construction and manufacturing of musical instruments. Recent research into the various and special sounds of instruments from different historical periods has been pivotal in new approaches to performance over the past quarter century (Historically Informed Performance). This course explores the historical development of musical instruments commonly used in performing Western art music, including various technologies influencing manufacturing techniques and construction, performing techniques, historical audience expectations of musical sound, and comparative performance practices. **Lecture 3, Credits 3 (Spring)**

FNRT-328 **Composing for Video Games and Interactive Media**
An audio professional working in the gaming industry is required to possess not only musical and audio talent, but also knowledge and experience with typical audio workflow. Composing for Video Games and Interactive Media prepares the student for a career in the industry by covering the many facets of sound production and engineering that are particular to game music and other forms of interactive media. **Lecture 3, Credits 3 (Annual)**

FNRT-329 **Virtual Worlds**
This course examines visual storytelling as an art form in video games. The study of visual storytelling in historic and contemporary art raises questions of social, cultural and political contexts as well as their impact on player experience. Through reading and analysis of art and video games, students will be exposed to different design techniques that visually express social concepts through mechanics, content and aesthetics. The course offers hands on experience with game engine software to create artistic game prototypes that incorporate theoretical approaches to cultural context. Topics may include the relationship of cultural context and environmental storytelling, the critical interpretation and application of visual techniques in fine art, the critical analysis of cultural and artistic themes in video games, creating meaningful worlds through visual and aural design, identity and representation in character design, and the impact of cultural context on the design of interactive and emergent narratives Students will use these concepts to create innovative game prototypes as meaningful cultural and artistic experiences. **Lecture 3, Credits 3 (Spring)**

FNRT-354 **Exhibition Design**
This course examines the history and practice of exhibition design. It reviews the history of exhibitions within the development of museum-like institutions. In this course the following aspects of exhibition design are considered: curatorial premise or theme, exhibition development timeline, exhibition site, contracts and contractual obligations, budgets and fundraising, publicity material, didactic material, and exhibition design. The course includes field trips to local institutions and collections throughout the semester. **Lecture 3, Credits 3 (Fall)**

FNRT-355 **Fundraising, Grant Writing, and Marketing for Nonprofit Institutions**
This course examines the growing autonomy of collecting institutions as they are cut off from various forms of governmental sponsorship and public subsidy and their subsequent needs for raising money from outside, non-traditional sources. The course looks at issues of needs assessment, budgeting, and strategic planning. It focuses on the design and implementation of effective fundraising campaigns, as well as on the organization and writing of successful grant proposals. It also considers the importance of marketing to overall institutional success. **Lecture 3, Credits 3 (Fall)**

FNRT-356 **Interactive Design for Museums**
This is a project based course which explores the intersection of interactive design and museum education. Interactive museum programs have the potential to engage museum visitors by encouraging creative exploration, independent interpretation, and deeper understanding. Students will learn how to make the study of material culture more interesting and approachable by creating interactive projects for both the museum and the internet. Students will learn to incorporate educational outcomes into engaging learning experiences for museums. **Lecture 3, Credits 3 (Spring)**

FNRT-357 **Collections Management and Museum Administration**
This course presents an overview of the administration and management of museums and their collections. The course examines the governance structure of museums, focusing on personnel responsible for their administration, curation and education, and operations, as well as on the mission statement and policies they determine. The course also details the management of collections, including the development of a collections policy, management of that policy, documentation and record keeping, acquisitions, and the creation/management of exhibitions. Finally, the course considers collections care or preventive conservation, looking at both the facility and collections. Throughout the semester, legal and ethical issues pertaining to museums and their collections will be emphasized. **Lecture 3, Credits 3 (Spring)**

FNRT-358 **Legal and Ethical Issues for Collecting Institutions**
This course presents an overview of the legal and ethical issues that govern the institutions and personnel involved in collecting cultural resources. Collecting institutions are governed by national, state, and local laws that define how facilities and collections are used and this course will consider them, as well as the larger social and historical context out of which they developed. The course will consider the evolution of the museum as a public institution and how the legal system increasingly defined minimum standards for maintaining collections, the facilities in which they are housed, and guaranteeing public access; in addition legal standards for the collection will be studied, including definitions of ownership, what this means in terms of intellectual property rights, copyright, reproduction (traditional and electronic), and deaccessioning/disposal. These will be studied within the context of the society within which the institution functions. The course will also study the development of national and international ethical standards and will examine the codes of behavior that govern the personal and professional conduct of museum professionals and the practices that comprise conflicts of interest. Ethical standards for collecting institutions will also be considered, particularly those that address the responsibilities to a collection, the ethics of acquisition, the question of illicit or stolen material, the issues of human remains and objects of sacred significance, and repatriation. Attention will be paid to the changes in society that made these issues critical for collecting institutions. **Lecture 3, Credits 3 (Fall)**

FNRT-370 **American Painting**
A survey of the style and meaning in American paintings from the colonial limners, through the 19th and 20th centuries, to contemporary artists. It centers on what distinguishes painting of the colonies and of the United States from the European counterpart. **Lecture 3, Credits 3 (Fall)**

FNRT-371 **African-American Art**
This course provides an overview of African-American art, presented in three periods: from slavery through Reconstruction, from the Harlem Renaissance to the end of the 1930's, and modern and postmodern movements following World War II. There will be comparisons with representations of African Americans in film, music, and literature as we move through these periods. We will be sensitive to the development of artists' aesthetic language and the evolution of social and political points of view expressed in artists' work. We will examine the role of institutions in promoting African American art. **Lecture 3, Credits 3 (Fall)**

FNRT-372 **American Film of the Studio Era**
This course examines the history and aesthetics of the motion picture in the United States between the 1890s and the early 1960s; emphasis will be placed on the analysis of both the work of major American filmmakers and the development of major American film genres during the Classical Hollywood Studio period. Among the filmmakers to be studied are Griffith, Chaplin, Hawks, Ford, Capra, Welles, Curtiz, Wilder, Donen, Sirk, Ray, Hitchcock, and Kubrick. Genres to be covered include the melodrama, silent comedy, screwball comedy, western, thriller, film noir, newspaper film, and the gangster film. The films will be studied within the context of contemporary cultural and political events, and will be discussed from several viewpoints, including aesthetic, technical, social, and economic. The ways in which gender and class are constructed through the movies will also be a major focus of study. **Lecture 3, Credits 3 (Fall)**

FNRT-375

This course examines the role of women in the visual arts as both images makers and subject matter in order to see how gender plays a role in the conceptualization of creativity and art. Among the topics to be discussed are: the construction of femininity and gender in the patriarchy; art as an ideological practice; women, art, and society; art history, art education, and art evaluation; women artists and their contemporaries. **Lecture 3, Credits 3 (Spring)**

Women/Gender/Art**FNRT-378**

In this course we examine the public remembering and memorialization of historic events that leads to memorials and monuments in the fields of architecture, sculpture, and film. We begin by examining the nature of memory, and specifically of collective memory, and its relationship to historical events and its subsequent transformation in the process of memorialization. We then look at examples of the sculptural monument, a traditional form of memorial, and the evolution of its vocabulary in the second half of the 20th century. We also examine the memorial work undertaken by those museums whose primary function is to engage in remembering historical events, a recent phenomenon in the field of museum building. We screen films and examine how documentaries and dramatizations engage the spectator by remembering history differently. The course culminates by examining the debates surrounding the remembering of 9/11 and of more recent traumatic events. **Lecture 3, Credits 3 (Fall)**

Memory, Memorials, Monuments**FNRT-379**

A survey outlining the development of art in India and Southeast Asia, examining the philosophical circumstances and religious traditions (to include Buddhist, Hindu, Jain, and Islamic) that distinguish eastern artistic traditions. There is opportunity for each student to pursue special interest in depth. **Lecture 3, Credits 3 (Fall)**

Art of India and Southeast Asia**FNRT-380**

A survey outlining the development of art in China, Korea and Japan, examining the philosophical circumstances and religious traditions (to include Daoism, Confucianism, and Buddhism) that distinguish eastern artistic traditions. There is opportunity for each student to pursue special interest in depth. **Lecture 3, Credits 3 (Spring)**

Art of China, Korea and Japan**FNRT-381**

A survey of artistic traditions (to include architecture, decorative arts [metalware, ceramics, glass, wood], art of the book and painting) from the 7th century until the Mongol conquests in the 13th century in countries from Asia, Africa, and Europe that were influenced by the religion of Islam. There will be opportunity for each student to pursue special interests in depth. **Lecture 3, Credits 3 (Fall)**

Art of Islam: the Arabic Tradition**FNRT-382**

A survey of artistic traditions (to include architecture, decorative arts [metals, ceramics, glass, wood], art of the book and painting) from the Mongol conquests in the 13th century until the European imperialistic presence in the later 18th century in countries from Asia, Africa, and Europe that were influenced by the religion of Islam. There will be opportunity for each student to pursue special interests in depth. **Lecture 3, Credits 3 (Spring)**

Art of Islam: Persian/Turkish/Mughal Traditions**FNRT-485**

This course is designed for the student who has a knowledge of basic music theory and an understanding of four-part diatonic composition. In addition to the continuing study of melodic construction and development, thematic development in two-part counterpoint, four-part harmony, chromatic materials and modulation, and analysis of form and style, emphases will be placed on the development of individual music skills. (Prerequisites: FNRT-205 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

Music Theory 2**Foreign Language–Arabic****MLAR-030**

This course in Arabic (zero credit) introduces students to Modern Standard Arabic. It introduces the Arabic alphabet and builds the foundational skills with an emphasis on simple conversation (basic constructions and sentences). This course will be taught fully online. This course is a UAE Ministry of Education requirement for students who do not meet the minimum entry standards of Arabic language. This course is remedial in nature and intended for RIT Dubai students only. (RIT Dubai) **Seminar, Credits 0 (Fall, Spring)**

Introduction to Arabic**MLAR-201**

Beginning Arabic I introduces students with no prior knowledge of the language to Modern Standard Arabic. Beginning Arabic I builds the foundation skills in speaking, listening, reading, writing, and culture, with emphasis on beginning writing and on conversation. Students must take placement exam if this is their first RIT class in Arabic and they have some prior study of Arabic. **Seminar 4, Credits 4 (Fall)**

Beginning Arabic I**MLAR-202**

Beginning Arabic II is the second course at the beginning level. It focuses on the development of functional competence in speaking, listening, reading, writing and culture. (Prerequisites: Minimum score of 1 on RIT Language Placement Exam or MLAR-201 or equivalent course.) **Seminar, Credits 4 (Spring)**

Beginning Arabic II**MLAR-301**

Intermediate Arabic I continues with intermediate-level development of functional skills in speaking, listening, reading, writing and culture, including conversation, with increased work in reading and writing. (Prerequisites: Minimum score of 2 on RIT Language Placement Exam or MLAR-202 or MLAR-202T or equivalent course.) **Seminar, Credits 3 (Fall)**

Intermediate Arabic I**MLAR-302**

Intermediate Arabic II, the second course at the intermediate level, engages students in further mastery of four skills with emphasis in conversation, reading and writing. (Prerequisites: Minimum score of 3 on RIT Language Placement Exam or MLAR-301 or equivalent course.) **Seminar, Credits 3 (Spring)**

Intermediate Arabic II**MLAR-401**

Advanced Arabic I, the beginning of the advanced (third year) sequence, does advanced work in all skills (speaking, listening, reading, writing, culture), including conversation, with increased work in reading, writing, and culture. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLAR-302 or equivalent course.) **Seminar, Credits 3 (Fall)**

Advanced Arabic I**MLAR-402**

Advanced Arabic II, the final course of the advanced (third year) sequence, continues study of the advanced-year textbook and does advanced work in all skills (speaking, listening, reading, writing, culture), including conversation, with increased work in reading, writing and culture. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLAR-302 or equivalent course.) **Seminar, Credits 3 (Spring)**

Advanced Arabic II**MLAR-449**

An in-depth exploration of the Arabic language and culture focusing on skills/topics that are not covered in sequential regular language courses. Prerequisite: varies; contact the instructor. **Seminar 3, Credits 3 (Fall, Spring, Summer)**

Topics in Arabic**Foreign Languages–American Sign Language****MLAS-201**

ASL I includes linguistic features, cultural protocols and core vocabulary for students to function in basic ASL conversations that include ASL grammar for asking and answering questions while introducing oneself, exchanging personal information, talking about family, friends and surroundings, and discussing activities. This course is designed for students who have no knowledge of American Sign Language. Students must take placement exam if this is their first RIT class in Sign Language and they have some prior study of Sign Language. **Seminar, Credits 4 (Fall, Spring, Summer)**

Beginning American Sign Language I**MLAS-202**

This course expands the basic principles presented in ASL I. ASL II teaches students to use linguistics features, cultural protocols and core vocabulary to function in basic ASL conversations that include ASL grammar for giving directions, describing, making request, talking about family, occupations and routines, and attributing qualities to others. (Prerequisites: Minimum score of 1 on RIT Language Placement Exam or MLAS-201 or equivalent course.) **Seminar, Credits 4 (Fall, Spring, Summer)**

Beginning American Sign Language II**MLAS-301**

This course builds upon information taught in Beginning ASL I and II and introduces expanded grammatical features of ASL and specialized vocabulary, while continuing to increase fingerspelling and numbers receptive and expressive skills. In addition, some basic features of ASL discourse are taught in organizing and explaining contextual information. (Prerequisites: Minimum score of 2 on RIT Language Placement Exam or MLAS-202 or MLAS-202T or INTPL-125 or equivalent course.) **Seminar 3, Credits 3 (Fall, Spring)**

Intermediate American Sign Language I**MLAS-302**

This course builds upon information taught in Beginning ASL I-Intermediate ASL I. Students continue learning and using ASL vocabulary, grammatical principles and various intermediate-level discourse features in narratives and presentations in ASL. Students analyze multiple meaning English words and English idioms to express concepts in ASL. Issues related to Deaf culture continue to be introduced based on unit topics. (Prerequisites: Minimum score of 3 on RIT Language Placement Exam or MLAS-301 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

Intermediate American Sign Language II

College of Liberal Arts

MLAS-351

Linguistics of American Sign Language

Students in this course will be introduced to the study of American Sign Language in terms of its linguistic structure and use. In particular, students will learn to analyze the basic features of ASL phonology, morphology, syntax, semantics and pragmatics/discourse. In addition, research related to variation in ASL and acquisition of ASL will also be reviewed. Please note fluency in ASL is required for this course, as instruction is in ASL (an interpreter will not be provided). **Seminar 3, Credits 3 (Fall, Spring)**

MLAS-352

American Sign Language Literature

In this course, students will explore a wide range of literary works representing the various genres of ASL literature. Students will be expected to analyze works in terms of literary conventions/techniques as well as relevant cultural symbols and themes. Attention will be given to historical context, Deaf cultural values, and the style/conventions used by individual literary artists. Each student will be required to complete literary analysis papers. In addition, students will be expected to create original ASL literary works and/or retell well-known ASL literary works as individuals or in collaboration with other students. This course requires fluency in ASL, as instruction is conducted in ASL, without an interpreter, and will require considerable reading and viewing of videotaped materials. **Seminar, Credits 3 (Fall)**

MLAS-401

Advanced American Sign Language I

This course builds upon information taught in Beginning ASL I – Intermediate ASL II. Students continue learning and using ASL vocabulary, grammatical principles and various advanced-level discourse features in narratives and presentations in ASL. Students continue to analyze multiple meaning English words and English idioms to express concepts in ASL. Issues related to Deaf culture continue to be introduced based on unit topics. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLAS-302 or equivalent course.) **Seminar 3, Credits 3 (Fall, Spring)**

MLAS-402

Advanced American Sign Language II

This course builds upon information taught in Beginning ASL I - Advanced ASL I. Students continue learning and using ASL vocabulary, grammatical principles and various advanced-level discourse features in narratives and presentations in ASL. Students analyze different components in storytelling. ASL Literature will be introduced in this level. Students identify controversial issues in various works of ASL Literature. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLAS-401 or equivalent course.) **Seminar 3, Credits 3 (Fall, Spring)**

MLAS-449

Special Topics in Deaf Cultural Studies

An in-depth exploration of American Sign Language and Deaf culture focusing topics that are not covered in regular language courses. Prerequisite: varies; contact the instructor. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

Foreign Languages–Chinese

MLCH-151

Food, Art, and Thought in Chinese Culture

This course introduces Chinese culture and society through the lens of food, art, and thought. China is one of the oldest civilizations in the world, and ancient Chinese culture is the root of many cultural practices and traditions in East Asia. The course surveys Chinese civilization from the beginning to the modern time, highlighting fundamental ideas and practices that shape the Chinese culture and way of life. It addresses a broad range of topics including but not limited to systems of thought (Confucianism, Daoism, Buddhism), Chinese art forms (poetry, ink painting, calligraphy, and martial arts), tea, and Chinese cuisine. Students will also explore how Chinese thought, art, and cultural practices connect China with the world as cultural encounters and exchanges take place. **Lecture 3, Credits 3 (Annual)**

MLCH-201

Beginning Chinese I

This course is designed for beginners, with no prior study of Chinese. It introduces students to the sounds, basic sentence structures, and the writing system of Mandarin Chinese. Pinyin, the Romanization (phonetic transliteration) of Mandarin Chinese, is taught and required throughout the course. Students also learn to read and write Chinese characters. Emphasis is on developing listening and speaking skills, as well as building a vocabulary based on the ideographic Chinese characters. Chinese culture is also introduced through the course. Students must take a placement exam if this is their first RIT class in Chinese and they have some prior knowledge of Mandarin Chinese. **Seminar, Credits 4 (Fall, Spring)**

MLCH-202

Beginning Chinese II

This course continues the beginning level of Chinese study. The focus is on developing listening and speaking skills, with an increasing emphasis on reading and writing skills. Students will learn more expressions, sentence structures as well as other parts of the Chinese grammar. Further aspects of Chinese culture are also introduced, in parallel to Chinese language study. (Prerequisites: Minimum score of 1 on RIT Language Placement Exam or MLCH-201 or equivalent course.) **Seminar, Credits 4 (Fall, Spring)**

MLCH-301

Intermediate Chinese I

This course begins the intermediate level of Chinese study. Knowledge of Pinyin, Chinese characters, and sentence structures covered by the beginning level of Chinese study is required before taking this course. The focus continues to be on developing listening, speaking, reading, and writing skills. Further aspects of Chinese culture are also introduced, in parallel to Chinese language study. (Prerequisites: Minimum score of 2 on RIT Language Placement Exam or MLCH-202 or MLCH-202T or equivalent course.) **Seminar, Credits 3 (Fall, Spring)**

MLCH-302

Intermediate Chinese II

This course continues the intermediate level of Chinese study. Knowledge of Pinyin, Chinese characters, and sentence structures covered by the first three semesters of Chinese learning is required before taking this course. The focus continues to be on developing listening, speaking, reading, and writing skills. Further aspects of Chinese culture are also introduced, in parallel to Chinese language study. (Prerequisites: Minimum score of 3 on RIT Language Placement Exam or MLCH-301 or equivalent course.) **Seminar, Credits 3 (Fall, Spring)**

MLCH-310

Intermediate Conversational Chinese

This course aims to improve students' Chinese language proficiency and focuses especially on enhancing their conversational skills. The course will also increase students' knowledge of Chinese culture in comparison with American culture through exposure to authentic sources. Students will learn expressions and manners of speaking during formal and informal Chinese conversations about their daily experiences. Students will develop their listening skills and will be able to gather general ideas and necessary details from authentic oral materials. They will also improve their abilities of narrating and describing familiar topics with various sentence structures. This course is especially suitable for students planning to study or work in China and desiring confidence and basic competence in communicating. (Prerequisites: Minimum score of 2 on RIT Language Placement Exam or MLCH-202 or MLCH-202T or equivalent course.) **Seminar 3, Credits 3 (Spring)**

MLCH-315

Intermediate Reading and Writing in Chinese

This course is designed to enhance students' ability to read authentic Chinese materials and write a variety of texts in Chinese, such as messages, blogs, emails, and short stories, more effectively. The main focus is to develop practical reading and writing skills that are essential for daily life by employing vocabulary, idioms, expressions, and structures in a more natural and descriptive fashion. This course provides students the opportunity to practice reading and writing strategies in meaningful and practical contexts, and to reinforce the materials that they have learned. Through reading, writing, discussion, multimedia, and presentations, students will learn the Chinese language in the context of describing nature, people, Chinese daily life and culture. (Prerequisites: Minimum score of 3 on RIT Language Placement Exam or MLCH-301 or MLCH-310 or equivalent course.) **Seminar 3, Credits 3 (Annual)**

MLCH-352 Globalization and Gender through Chinese Cinema: From Kungfu to World Factory

This course surveys Chinese cinema from its beginning to the present with special attention to its transnational connections and gender representation. Films from the mainland, Taiwan, and Hong Kong will be examined in-depth for their aesthetic quality and techniques, and equally important, against their socio-historical, political, economic, and cultural contexts. Topics include Kungfu films, women's cinema, documentation of globalization, independent filmmaking and social activism, and more. The class is conducted in English. Assigned films will be in Chinese with English subtitles. **Lecture 3, Credits 3 (Biannual)**

MLCH-401

Advanced Chinese I

This course begins the advanced level of Chinese study. It is designed to further develop competence in the four language skills of listening, speaking, reading, and writing. Following Intermediate Chinese II, this course continues the grammar acquisition, expansion of vocabulary with more lengthy reading and writing. Classroom discussion and writing practice are important parts of the course. By the end of the course work, students should be able to express views on serious, topical issues in increased detail. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLCH-302 or equivalent course.) **Seminar, Credits 3 (Fall)**

MLCH-402

Advanced Chinese II

This course continues the advanced level of Chinese study. The main purpose of this course is to further develop competence in language skills as well as cultural literacy by using the textbook as well as a diversity of authentic multimedia materials that pertain to Chinese matters and values. By identifying, analyzing, comparing, and discussing both traditional and contemporary Chinese socio-cultural issues, students will acquire a better understanding of the language, culture, and Chinese society. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLCH-401 or equivalent course.) **Seminar, Credits 3 (Spring)**

MLCH-410**Chinese for Science and Technology**

This course teaches specialized terminology and linguistic structures important for communicating scientific and technological knowledge in the target language. The focus is on developing students' listening, speaking, reading, and writing skills in interpreting technical Chinese. Students will learn science and technology terms and structures in a broad range of technical areas via experiential learning activities. In addition, students will research and present topics of their own interest or beyond their disciplines. Students will expand their knowledge of the target language to include technical terms/structures and prepare themselves to better apply their language skills in internships, research, and work while exploring and understanding the culture in professional workplaces. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLCH-302 or equivalent course.) **Seminar 3, Credits 3 (Annual)**

MLCH-415**Professional Chinese**

The course gives students an opportunity to study professional Chinese language and culture as well as to practice presentation and negotiation skills, especially in professional and formal contexts. Students will improve speaking, listening, reading and writing skills developed in the elementary/intermediate sequence to master formal interactions in Chinese. They will learn professional vocabulary, expressions, and grammatical structures through readings, conversation, and discussion. They will cultivate expressive skills through discussion, writing assignments, and a video tutorial project. This course will be useful for students who are planning to seek employment in Chinese companies or in companies doing business in Chinese speaking areas, and also for students who want to learn more about business in Chinese culture. This is a language class; proficiency equivalent to Intermediate Chinese II is required. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLCH-302 or equivalent course.) **Seminar 3, Credits 3 (Annual)**

MLCH-431**Speaking and Culture Practicum in Chinese**

This one-credit course provides students opportunities to intensively practice and improve real-life speaking skills in the target language, beyond what is possible in regular language courses. Grammar relevant to each context and communicative goal may be reviewed as necessary. This course may also provide cultural information related to current events and daily life. Open to any students who desire extra practice in Chinese speaking. **Seminar 1, Credits 1 (Fall, Spring)**

MLCH-449**Topics in Chinese**

An in-depth exploration of the Chinese language and culture focusing on skills/topics that are not covered in sequential regular language courses. Prerequisite: varies; contact the instructor. **Colloquium 3, Credits 1 - 4 (Fall, Spring, Summer)**

Foreign Language–Applied Modern Language/Culture**MLCU-301****Psycholinguistics**

This course introduces main subfields of psycholinguistics, a study that deals with all aspects of human language performance: language acquisition, sentence processing/comprehension, and sentence production/speaking. Through readings on theoretical and experimental studies, findings and issues in first language acquisition, sentence processing, and sentence production are introduced. By discussing how speakers of different languages acquire, comprehend, and produce sentences, the course also examines interactions with language-specific, linguistic constraints and human language performances. **Lecture 3, Credits 3 (Spring)**

MLCU-302**Introduction to Syntax**

This course examines the foundational abstract rules, principles, and processes of sentence structure from a cross-linguistic perspective. It explores how different linguistic units, e.g. morphemes, words, and phrases, are combined into syntactic grammatical sentences. This course introduces techniques of syntactic analyses and allows students to address empirical questions regarding syntactic properties of different languages. Topics covered include phrase structures, grammatical relations, and transformations. **Lecture 3, Credits 3 (Biannual)**

MLCU-498**MLC Internship**

A semester or summer-length experience in a professional setting related to the student's MLC target language and culture, with a minimum of 150 hours. The experience integrates students' knowledge of the target language and culture with professional experience. (Students must demonstrate language proficiency appropriate for the internship and department approval required.) (Prerequisites: Completion of MLXX Intermediate 2 or equivalent course or equivalent language placement score of on RIT Language Placement Exam.) **Internship, Credits 0 (Biannual)**

MLCU-549**Capstone Seminar in Applied Modern Language and Culture**

This upper division seminar constitutes the final core requirement in the Applied Modern Language and Culture degree program. Students majoring in Applied Modern Language and Culture will enroll in this course in their final year of study. The capstone seminar will further develop and sharpen the connection between the students' professional or technical fields and their linguistic and cultural knowledge of the language of the track. The course will involve a variety of written and reading assignments, and/or project which involves professional fields. May be repeated up to twice. (Prerequisite: MLCH-402 or MLJP-402 or MLSP-402 or equivalent course.) **Seminar 3, Credits 3 (Fall, Spring)**

Foreign Languages–French**MLFR-151****Film, Comics, and French Culture**

The course focuses on French culture through feature films, animated films, and comic books. France is the strongest film industry in Europe and is one of the world's major movie export powers after the U.S. Franco-Belgian comics are one of the main groups of comics, together with American and British comic books and the Japanese manga. France is Europe's largest producer and the world's third largest exporter of animated film. What do French films and comics tell us about French culture? The course explores aspects of contemporary French society. It addresses a broad range of topics including multiculturalism in France, French cuisine and the French paradox, fashion in France, the impact of the two world wars on French society, the legacy of the French colonial experience, and ethnic and sexual minorities in France. The course examines the interconnectedness of French culture with other cultures in the world, particularly American culture and the cultures of former French colonies. Students will also have to interpret and evaluate French films and comic books considering the cultural context in which they were created. They will learn about the specificity of French cinema as opposed to Hollywood productions, of French animated films versus American animated films and Japanese anime, and of Franco-Belgian comics as opposed to American and British comics and the Japanese manga. The course also offers a brief introduction to spoken French. **Lecture 3, Credits 3 (Spring)**

MLFR-201**Beginning French I**

This is the first course in a two-course sequence. The sequence provides students without prior exposure to the language with a sound basis for learning French as it is used today in its spoken and written forms. The goal of the sequence is proficiency in communication skills with an emphasis on oral proficiency. The sequence also acquaints students with contemporary culture and life in French-speaking countries. Students must take placement exam if this is their first RIT class in French and they have some prior study of French. **Seminar, Credits 4 (Fall, Spring)**

MLFR-202**Beginning French II**

This is the second course in a two-course sequence. The sequence provides students without prior exposure to the language with a sound basis for learning French as it is used today in its spoken and written forms. The goal of the sequence is proficiency in communication skills with an emphasis on oral proficiency. The sequence also acquaints students with contemporary culture and life in French-speaking countries. (Prerequisites: Minimum score of 1 on RIT Language Placement Exam or MLFR-201 or equivalent course.) **Seminar, Credits 4 (Fall, Spring)**

MLFR-301**Intermediate French I**

This is the first course of a two-course sequence at the intermediate level. The sequence provides students with the tools necessary to increase their ability to function in French. Communicative activities, contemporary texts, vocabulary study, and grammar are used to expand all communication skills, especially oral proficiency. This sequence continues to address issues of contemporary French life and culture as well as the cultures of the Francophone world. (Prerequisites: Minimum score of 2 on RIT Language Placement Exam or MLFR-202 or MLFR-202T or equivalent course.) **Seminar, Credits 3 (Fall, Spring)**

MLFR-302**Intermediate French II**

This is the second course of a two-course sequence at the intermediate level. The sequence provides students with the tools necessary to increase their ability to function in French. Communicative activities, contemporary texts, vocabulary study, and grammar are used to expand all communication skills, especially oral proficiency. This sequence continues to address issues of contemporary French life and culture as well as the cultures of the Francophone world. (Prerequisites: Minimum score of 3 on RIT Language Placement Exam or MLFR-301 or equivalent course.) **Seminar, Credits 3 (Fall, Spring)**

MLFR-310 **French Oral Communication**
This course is designed to help students improve their oral communication in French by focusing on increasing and developing speaking and listening skills. Through communicative activities students will gain conversational skills in French and cultural knowledge about France and French people. The course also combines an examination of how French sounds are produced with practical exercises taken from a variety of sources, including songs and movie/tv show clips. Students in this course will improve their general fluency and oral accuracy while also increasing their knowledge of Francophone culture and colloquial French. Taught in French. (Prerequisites: Minimum score of 2 on RIT Language Placement Exam or MLFR-202 or MLFR-202T or equivalent course.) **Seminar 3, Credits 3 (Fall)**

MLFR-315 **French Reading and Writing Proficiency**
This course trains students to read and write in French at an advanced intermediate level of competency. Through gradual presentation and recognition of French grammar forms and vocabulary, students learn to comprehend, discuss, and analyze a wide variety of French texts, including songs, scripts of movies and TV series, comic books, skits, news items, canonical narratives, as well as some technical and scientific materials. Students also learn to write and express their ideas in grammatically correct French and to explore different genres and forms of writing. The course also expands students' knowledge of French and Francophone cultures. Conducted in French. (Prerequisites: Minimum score of 3 on RIT Language Placement Exam or MLFR-301 or equivalent course.) **Seminar 3, Credits 3 (Spring)**

MLFR-351 **French Films and Hollywood**
A comparative study of French films and their American remakes from the 1930s to the 21st century to determine what these films reveal about the cultural and cinematic contexts from which they emerge. The course examines differences as well as similarities in the construction of identities in France and the United States. Devotes particular attention to the (re)construction of race, space, gender, and national histories. Conducted in English. **Lecture 3, Credits 3 (Spring)**

MLFR-352 **The French Heritage in Films**
Heritage films are central to the French cinematographic production. They enable the transmission and the reevaluation of a tradition that lies at the core of French cultural identity. This course examines a selection of French films adapted from both canonical and non-canonical texts representative of major events, trends, social issues, and artistic movements that contributed to shaping modern France. Students will become familiar with world-renowned French novels, short stories, comic books, and films. The course deals with topics such as aristocratic culture, racial identity in France, the myth of the resistance and the legacy of the Second World War, France's rural past, the French colonial experience, women and bourgeois culture, the long-standing tradition of comic books and comedy in France, the Tradition of Quality, the French New Wave, and heritage films. The course also examines the interconnectedness of French culture and the cultures of the United States, England, and former French colonies. It notably explores how the French colonial experience informed the development of French cinema, and how French heritage films were both inspired and reinterpreted by British and American cinematographic industries to reflect the cultures and values of those societies. Conducted in English. **Lecture 3, Credits 3 (Spring)**

MLFR-401 **Advanced French I**
This is the first course of a two-course sequence at the advanced level. This course will emphasize active spoken language use. Other skills will also be used, such as reading, writing and listening, but primarily as helps for developing conversational ability. Attention will also be given to grammatical accuracy. Readings will cover historical and current events in France and in other Francophone cultures. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLFR-302 or equivalent course.) **Seminar, Credits 3 (Fall)**

MLFR-402 **Advanced French II**
This is the second course of a two-course sequence at the advanced level. This course will emphasize active spoken language use. Other skills will also be used, such as reading, writing and listening, but primarily as helps for developing conversational ability. Attention will also be given to grammatical accuracy. Readings will cover historical and current events in France and in other Francophone cultures. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLFR-302 or equivalent course.) **Seminar, Credits 3 (Spring)**

MLFR-410 **French for Science and Technology**
This course teaches specialized terminology and linguistic structures important for communicating scientific and technological knowledge in French. The focus is on developing students' listening, speaking, reading, and writing skills in interpreting technical French. Students will learn science and technology terms and structures in a broad range of technical areas via experiential learning activities. In addition, students will research and present topics of their own interest or beyond their disciplines. Students will expand their knowledge of French to include technical terms/structures and prepare themselves to better apply their language skills in internships, research, and work while exploring and understanding the culture in professional workplaces. Taught in French with a prerequisite of Intermediate French II. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLFR-302 or equivalent course.) **Seminar 3, Credits 3 (Spring)**

MLFR-415 **Professional French**
The course gives students an opportunity to study professional language and culture as well as to practice presentation and negotiation skills, especially in professional and formal contexts. Students will improve speaking, listening, reading and writing skills developed in the elementary/intermediate sequence to master formal interactions in French. They will learn professional vocabulary, expressions, and grammatical structures through readings, conversation, and discussion. They will cultivate expressive skills through discussion, writing assignments, and a video tutorial project. This course will be useful for students who are planning to seek employment in international companies or in companies doing business abroad, and also for students who want to learn more about business in the target culture. This is a language class; proficiency equivalent to Intermediate French II is required. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLFR-302 or equivalent course.) **Seminar 3, Credits 3 (Annual)**

MLFR-431 **Speaking and Culture Practicum in French**
This one-credit course provides students opportunities to intensively practice and improve real-life speaking skills in the target language, beyond what is possible in regular language courses. Grammar relevant to each context and communicative goal may be reviewed as necessary. This course may also provide cultural information related to current events and daily life. Open to any students that meet the level required for each section or equivalent who desire extra practice. (Prerequisite: MLFR-201 or equivalent course.) **Seminar 1, Credits 1 (Fall, Spring)**

MLFR-449 **Special Topics in French**
An in-depth exploration of the French language and culture focusing on skills/topics that are not covered in sequential regular language courses. Prerequisite: varies; contact the instructor. **Seminar 3, Credits 3 (Fall, Spring, Summer)**

Foreign Languages—German

MLGR-201 **Beginning German I**
This is the first course in a two-course sequence. The sequence provides students without prior exposure to the language with a sound basis for learning German as it is used today in its spoken and written forms. The goal of the sequence is proficiency in communication skills with an emphasis on oral proficiency. The sequence also acquaints students with contemporary culture and life in the German-speaking countries. Students must take a placement exam if this is their first RIT class in German and they have some prior study of German. **Seminar, Credits 4 (Fall, Spring)**

MLGR-202 **Beginning German II**
This is the second course in a two-course sequence. The sequence provides students without prior exposure to the language with a sound basis for learning German as it is used today in its spoken and written forms. The goal of the sequence is proficiency in communication skills with an emphasis on oral proficiency. The sequence also acquaints students with contemporary culture and life in the German-speaking countries. (Prerequisites: Minimum score of 1 on RIT Language Placement Exam or MLGR-201 or equivalent course.) **Seminar, Credits 4 (Fall, Spring)**

MLGR-301 **Intermediate German I**
This is the first course of a two-course sequence at the intermediate level. The sequence provides students with the tools to increase their ability to function in German. Communicative activities, contemporary texts, and the study of vocabulary and grammar are used to expand all communication skills, especially oral proficiency. This sequence continues to address issues of contemporary German life and culture. (Prerequisites: Minimum score of 2 on RIT Language Placement Exam or MLGR-202 or MLGR-202T or equivalent course.) **Seminar, Credits 3 (Fall, Spring)**

MLGR-302 **Intermediate German II**
This is the second course of a two-course sequence at the intermediate level. The sequence provides students with the tools to increase their ability to function in German. Communicative activities, contemporary texts, the study of vocabulary and grammar are used to expand all communication skills, especially oral proficiency. This sequence continues to address issues of contemporary German life and culture. (Prerequisites: Minimum score of 3 on RIT Language Placement Exam or MLGR-301 or equivalent course.) **Seminar, Credits 3 (Fall, Spring)**

MLGR-310**German Conversation and Oral Practice**

This course is designed to help students further develop two of the four basic language skills: listening and speaking. Students will expand on skills they have attained in previous language courses with particular emphasis on the advancement of their speaking proficiency in German. Through a task-based approach the course aims to assist students in learning to speak German with a greater degree of fluency and accuracy. Students will communicate solely in German throughout the course. Each class session will consist of communicative activities and practice. The learning of the German language will occur through the completion of communicative tasks in different formats and circumstances (e.g. interviews, situational sketches, oral projects). There will be little emphasis on grammar, but the emphasis on pronunciation and vocabulary will be significant. Authentic audiovisual materials will be an integral part of the course, as will the submission and review of spoken samples of German on the part of the student via MyCourses. (Prerequisites: Minimum score of 2 on RIT Language Placement Exam or MLGR-202 or MLGR-202T or equivalent course.) **Seminar 3, Credits 3 (Fall)**

MLGR-315**German Grammar through Reading and Writing**

In this course, students will read a variety of German texts. Through this process, they will develop the grammar and vocabulary skills needed to comprehend written German in specific fields. Students will work with texts from various sources, including articles in their own discipline. They will learn to analyze written texts and thereby develop useful language skills as well as specific vocabulary, as pertinent to their fields. A series of graduated reading exercises will also increase their overall grammar skills in German. At the same time, students will intensively practice their writing skills. They will be assigned a variety of writing assignments, compositions and essays in accordance with the topics covered by their reading exercises. Their writing activities will cover a number of different formats and styles, such as film/book reviews, letters to the editor, personal essays, creative essays, analytical texts, short newspaper articles, and scientific abstracts. (Prerequisites: Minimum score of 3 on RIT Language Placement Exam or MLGR-301 or equivalent course.) **Seminar 3, Credits 3 (Spring)**

MLGR-351**Modern German Culture through Film**

This course is organized around the notion of what Germany is today and the historical, social, cultural and literary determinants of that concept. Through a series of texts, films and videos designed to introduce the students to contemporary German society, thought and cultural practices, the course seeks to explore the following questions: What is Germany today? What is it to be German today? How do the Germans see themselves, and how are they seen by others? In what ways do cultural practices, globalization, and ethnicity influence the formation of modern German identity (and is there one)? Where do these notions come from? How does that compare to notions of identity and society in the US? Discussions will include analysis of cultural stereotypes, family life, sports, language, media, politics, immigration, etc. The focus of this course is cultural analysis, exploration, and comparison. In order to critically examine these questions, this course focuses on various aspects of modern German culture from the 1950's to the present. Since the fall of the Berlin wall in 1989, German society has undergone numerous changes, which manifest themselves politically, socially, culturally and economically. Through films, readings in history and social science, magazine articles, literature and books, this course will scrutinize these changes and their meaning within the context of present-day German society. **Lecture 3, Credits 3 (Spring)**

MLGR-401**Advanced German I**

This is the first course of a two-course sequence at the advanced level. This sequence is designed to develop in-depth proficiency in the four language skills of speaking, understanding, reading, and writing. This sequence develops the ability to understand and communicate freely on a variety of familiar and unfamiliar topics by expanding the vocabulary base and by discussions, compositions, and oral reports based on cultural and literary texts and audio-visual materials. The sequence includes a rigorous study of advanced grammatical structures and usage. Students must take a placement exam if this is their first RIT class in German and they have prior study of German. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLGR-302 or equivalent course.) **Seminar, Credits 3 (Fall)**

MLGR-402**Advanced German II**

This is the last course of a two-course sequence at the advanced level. This sequence is designed to intensively develop proficiency in the four language skills of speaking, understanding, reading, and writing. This sequence develops the ability to understand and communicate freely by expanding the vocabulary base and by discussions, compositions, and oral reports, based on cultural and literary texts and audio-visual materials. The sequence includes a rigorous study of advanced grammatical structures and usage. Students must take a placement exam if this is their first RIT class in German and they have prior study of German. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLGR-302 or equivalent course.) **Seminar, Credits 3 (Spring)**

MLGR-410**German for Science and Technology**

This course teaches specialized terminology and linguistic structures important for communicating scientific and technological knowledge in German. The focus is on developing students' listening, speaking, reading, and writing skills in interpreting technical German. Students will learn science and technology terms and structures in a broad range of technical areas via experiential learning activities. In addition, students will research and present topics of their own interest or beyond their disciplines. Students will expand their knowledge of the target language to include technical terms/structures and prepare themselves to better apply their language skills in internships, research, and work environments while exploring and understanding the culture in professional workplaces. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLGR-302 or equivalent course.) **Seminar 3, Credits 3 (Spring)**

MLGR-415**Professional German**

The course gives students an opportunity to study professional language and culture as well as to practice presentation and negotiation skills, especially in professional and formal contexts. Students will improve speaking, listening, reading and writing skills developed in the elementary/intermediate sequence to master formal interactions in German. They will learn professional vocabulary, expressions, and grammatical structures through readings, conversation, and discussion. They will cultivate expressive skills through discussion, writing assignments, and a video tutorial project. This course will be useful for students who are planning to seek employment in international companies or in companies doing business abroad, and also for students who want to learn more about business in the target culture. This is a language class; proficiency equivalent to Intermediate German II is required. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLGR-302 or equivalent course.) **Seminar 3, Credits 3 (Spring)**

MLGR-449**Topics in German**

An in-depth exploration of the German language and culture focusing on skills/topics that are not covered in sequential regular language courses. Prerequisite: varies; contact the instructor. **Colloquium 3, Credits 1 - 4 (Fall, Spring, Summer)**

Foreign Languages—Italian

MLIT-201**Beginning Italian I**

This is the first course in a two-course sequence. The sequence provides students without prior exposure to the language with a sound basis for learning Italian as it is used today in its spoken and written forms. The goal of the sequence is proficiency in communication skills with an emphasis on oral proficiency. The sequence also acquaints students with contemporary culture and life in the Italian-speaking countries. Students must take placement exam if this is their first RIT class in Italian and they have some prior study of Italian. **Seminar, Credits 4 (Fall, Spring)**

MLIT-202**Beginning Italian II**

This is the second course in a two-course sequence. The sequence provides students without prior exposure to the language with a sound basis for learning Italian as it is used today in its spoken and written forms. The goal of the sequence is proficiency in communication skills with an emphasis on oral proficiency. The sequence also acquaints students with contemporary culture and life in the Italian-speaking countries. (Prerequisites: Minimum score of 1 on RIT Language Placement Exam or MLIT-201 or equivalent course.) **Seminar, Credits 4 (Fall, Spring)**

MLIT-301**Intermediate Italian I**

This is the first course of a two-course sequence at the intermediate level. The sequence provides students with the tools to increase their ability to function in Italian. Communicative activities, contemporary texts, and the study of vocabulary and grammar are used to expand all communication skills, especially oral proficiency. This sequence continues to address issues of contemporary Italian life and culture. (Prerequisites: Minimum score of 2 on RIT Language Placement Exam or MLIT-202 or MLIT-202T or equivalent course.) **Seminar, Credits 3 (Fall, Spring)**

MLIT-302**Intermediate Italian II**

This is the first course of a two-course sequence at the intermediate level. The sequence provides students with the tools to increase their ability to function in Italian. Communicative activities, contemporary texts, and the study of vocabulary and grammar are used to expand all communication skills, especially oral proficiency. This sequence continues to address issues of contemporary Italian life and culture. (Prerequisites: Minimum score of 3 on RIT Language Placement Exam or MLIT-301 or equivalent course.) **Seminar, Credits 3 (Fall, Spring)**

MLIT-351 **Italian Cinema from Neorealism to the New Millennium**
Comparative study of Italian New Cinema and its predecessors from 1945 to the 21st century. Devotes particular attention to the perspectives that shaped race, space, gender, and national histories revealed through the cultural and cinematic contexts. Students will view and compare cinema from the Neorealist canon and the New Italian Cinema to explore the possible common thread in film language and the issues discussed. A special attention is given to gender construction in Italian cinema and cinema from United States. The students will write a comparative research paper on more than two films from the different periods, or create a project such as a short film. The course also contrasts the Italian culture and the cultures of the United States, Europe, Asia, and Africa. It explores how Italian cinema was seminal in the development of cinematographic industries and production of other countries. Specific attention will be given to the comparison of Italian culture and colonial experience and the Global South. Conducted in English. **Lecture 3, Credits 3 (Fall)**

MLIT-401 **Advanced Italian I**
This is the first course of a two-course sequence at the advanced level. The sequence provides students with the tools to increase their ability to function in Italian. Communicative activities, contemporary texts, and the study of vocabulary and grammar are used to expand all communication skills, especially oral proficiency. This sequence continues to address issues of contemporary Italian life and culture. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLIT-302 or equivalent course.) **Seminar, Credits 3 (Fall)**

MLIT-402 **Advanced Italian II**
This is the first course of a two-course sequence at the advanced level. The sequence provides students with the tools to increase their ability to function in Italian. Communicative activities, contemporary texts, and the study of vocabulary and grammar are used to expand all communication skills, especially oral proficiency. This sequence continues to address issues of contemporary Italian life and culture. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLIT-302 or equivalent course.) **Seminar, Credits 3 (Spring)**

MLIT-431 **Speaking and Culture Practicum in Italian**
This one-credit course provides students opportunities to intensively practice and improve real-life speaking skills in the target language, beyond what is possible in regular language courses. Grammar relevant to each context and communicative goal may be reviewed as necessary. This course may also provide cultural information related to current events and daily life. Open to any students that meet the level required for each section or equivalent who desire extra practice. **Seminar 1, Credits 1 (Fall)**

MLIT-449 **Topics in Italian**
An in-depth exploration of the Italian language and culture focusing on skills/topics that are not covered in sequential regular language courses. **Colloquium 3, Credits 1 - 4 (Fall, Spring, Summer)**

Foreign Languages–Japanese

MLJP-201 **Beginning Japanese I**
This is the first course in the first year sequence designed for students with no prior exposure to Japanese. It provides a sound introduction to the language as it is spoken and written today. A strong emphasis is placed on oral proficiency and the appropriate use of language in Japanese society. Hiragana and Katakana syllabary is also taught for written communication. Not open to students with prior Japanese instruction. Students must take placement exam if this is their first RIT class in Japanese and they have some prior study of Japanese. **Seminar, Credits 4 (Fall, Spring, Summer)**

MLJP-202 **Beginning Japanese II**
This is the second course in the first-year sequence. It provides a sound introduction to the language as it is spoken and written today. A strong emphasis is placed on proficiency and the appropriate use of language in the Japanese society. Students continue to learn how to use language in real-life situations for different communication purposes. Approximately 120 Kanji characters are also introduced for written communication. Students must have a good command of Hiragana and Katakana and basic knowledge of Kanji to take this course. (Prerequisites: Minimum score of 1 on RIT Language Placement Exam or MLJP-201 or equivalent course.) **Seminar, Credits 4 (Fall, Spring)**

MLJP-301 **Intermediate Japanese I**
This is the first course in the second-year sequence designed to give students more advanced instruction and practice in the skills of speaking, reading, writing, and comprehending contemporary Japanese. A strong emphasis is placed on proficiency through reading, writing, and speaking activities. Students learn cultural information and practice using the language in real life situations in Japanese society. Approximately 60 new Kanji are introduced. (Prerequisites: Minimum score of 2 on RIT Language Placement Exam or MLJP-202 or MLJP-202T or equivalent course.) **Seminar, Credits 3 (Fall, Spring)**

MLJP-302 **Intermediate Japanese II**
This is the second course in the second-year sequence designed to give students more advanced instruction and practice in the skills of speaking, reading, writing, and comprehending contemporary Japanese. A strong emphasis is placed on proficiency through reading, writing, and speaking activities. Students learn cultural information and practice using the language in real life situations in Japanese society. Approximately 120 new Kanji are introduced. (Prerequisites: Minimum score of 3 on RIT Language Placement Exam or MLJP-301 or equivalent course.) **Seminar, Credits 3 (Fall, Spring)**

MLJP-310 **Practical Reading and Speaking in Japanese**
This course aims to cultivate basic skills that are essential for daily life in Japan. The main focus is on the development of reading skills and oral communication skills with the use of common phrases, expressions, and Kanji characters that are commonly used in the Japanese society today. This course gives students the opportunity to read various practical texts such as signs, advertisements, notes, instructions, notices, and e-mails. The course also provides students opportunities to strengthen practical communication skills through activities and daily life situations such as filling out forms, asking for information, explaining situations in detail, and giving thoughts on daily matters. This course reinforces the materials learned in the beginning level in Japanese. Students need to continue the sequential courses (Intermediate Japanese I and II) in order to advance in the intermediate level. (This course requires permission of the Instructor to enroll.) **Seminar 3, Credits 3 (Spring)**

MLJP-315 **Practical Writing and Speaking in Japanese**
This course aims to enhance basic writing and speaking skills that are essential for daily life in Japan. The main focus is on the development of practical daily conversational skills and writing with the use of common phrases, expressions, and Kanji characters that are commonly used in the Japanese society today. This course gives students the opportunity to practice writing various practical passages and texts such as application forms, advertisements, e-mails, blogs, and letters. The course also provides students opportunities to strengthen practical communication skills through activities and daily life situations such as asking for information, explaining situations in detail, and giving thoughts on daily matters. This course reinforces the materials learned at the beginning level in Japanese. Students need to continue the sequential courses (Intermediate Japanese I and II) in order to advance in the intermediate level. **Seminar 3, Credits 3 (Fall)**

MLJP-351 **Languages in Japanese Society**
This course aims to introduce students to modern Japanese society, its rich cultural heritage, and the use of Japanese language that reflects the societal norms. It provides students with a fundamental yet diverse knowledge of Japanese culture and Japanese language use. Course work will include lectures, readings, discussions, and working with multi-media resources. Knowledge of Japanese helpful but not necessary. **Lecture 3, Credits 3 (Fall, Spring)**

MLJP-401 **Advanced Japanese I**
This course provides advanced students of Japanese with training in all four language skills. Students will practice oral communication with a high degree of proficiency in various social settings. They will improve communicative skills with discussions and debate. They will also receive training in reading semi-authentic and authentic materials with the help of a dictionary, as well as training in writing for a specific purpose, such as news reports and critical essays. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLJP-302 or equivalent course.) **Seminar, Credits 3 (Fall)**

MLJP-402 **Creative Writing and Performance in Japanese**
This course provides advanced students of Japanese with training in spoken and written production. Students will learn the different writing styles and style in speech in Japanese that range from casual to formal, and will apply them to differentiate the speaking and writing as they engage in spoken and written productions. Production activities include, but not limited to, creative, expository, and persuasive writing and speaking, and some short visual performance such as play. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLJP-302 or equivalent course.) **Lab, Credits 3 (Spring)**

MLJP-402 **Creative Writing and Performance in Japanese**
This course provides advanced students of Japanese with training in spoken and written production. Students will learn the different writing styles and style in speech in Japanese that range from casual to formal, and will apply them to differentiate the speaking and writing as they engage in spoken and written productions. Production activities include, but not limited to, creative, expository, and persuasive writing and speaking, and some short visual performance such as play. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLJP-302 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MLJP-404**Japanese Culture in Print**

Through selected readings of essays, novels, biographies of historical figures, and contemporary manga (Japanese comics), this course gives students the opportunity to learn about Japanese culture, society, and history, in the Japanese language. Also, through discussing and writing as well as reading, this course refines students' language skills with the aim of expressing their thoughts. Furthermore, through individual readings selected by the student and based on their area of interest and ability, this course provides the opportunity to develop expressive skills in Japanese. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLJP-302 or MLJP-401 or MLJP-402 or equivalent course.) **Seminar, Credits 3 (Fall)**

MLJP-405**Advanced Speaking in Japanese**

This course is designed to establish speaking proficiency at an advanced level by expanding students' understanding of the socio-cultural knowledge necessary for communication. Readings concerning such topics as recent social developments and traditional culture in Japan will provide the basis for students' discussions in class as well as writing assignments. Students will also master both formal and informal interactions in Japanese in various contexts by practicing dialogues and creating role-plays on situations associated with the topics and skills required for advanced speakers. Moreover, each student will conduct research on a topic related to Japan and give a presentation in Japanese in class. With these kinds of activities, students will not only improve such practical communication skills as expressing their thoughts and giving explanations, but also acquire vocabulary, expressions and kanji characters at a more advanced level, and deepen their understanding of Japan. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLJP-302 or equivalent course.) **Seminar 3, Credits 3 (Spring)**

MLJP-410**Japanese for Science and Technology**

This course teaches specialized terminology and linguistic structures important for communicating scientific and technological knowledge in the target language. The focus is on developing students' listening, speaking, reading, and writing skills in interpreting technical Japanese. Students will learn science and technology terms and structures in a broad range of technical areas via experiential learning activities. In addition, students will research and present topics of their own interest or beyond their disciplines. Students will expand their knowledge of the target language to include technical terms/structures and prepare themselves to better apply their language skills in internships, research, and work while exploring and understanding the culture in professional workplaces. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLJP-302 and (MLJP-315 or MLJP-310) or equivalent course.) **Seminar 3, Credits 3 (Spring)**

MLJP-415**Professional Japanese**

The course gives students an opportunity to study professional language and culture as well as to practice presentation and negotiation skills, especially in professional and formal contexts. Students will improve speaking, listening, reading and writing skills developed in the elementary/intermediate sequence to master formal interactions in Japanese. They will learn professional vocabulary, expressions, and grammatical structures through readings, conversation, and discussion. They will cultivate expressive skills through discussion, writing assignments, and a video tutorial project. This course will be useful for students who are planning to seek employment in international companies or in companies doing business abroad, and also for students who want to learn more about business in Japan. This is a language class; proficiency equivalent to Intermediate Japanese II is required. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLJP-302 and (MLJP-315 or MLJP-310) or equivalent course.) **Seminar 3, Credits 3 (Annual)**

MLJP-431**Speaking and Culture Practicum in Japanese**

This one-credit course provides students opportunities to intensively practice and improve real-life speaking skills in the target language, beyond what is possible in regular language courses. Grammar relevant to each context and communicative goal may be reviewed as necessary. This course may also provide cultural information related to current events and daily life. Open to any students that meet the level required for each section or equivalent who desire extra practice. **Seminar 1, Credits 1 (Fall, Spring)**

MLJP-449**Topics in Japanese**

An in-depth exploration of the Japanese language and culture focusing on skills/topics that are not covered in sequential regular language courses. Prerequisite: varies; contact the instructor. **Colloquium 3, Credits 1 - 4 (Fall, Spring, Summer)**

MLJP-451**Structure of the Japanese Language**

This course aims to increase student understanding of basic characteristics of the Japanese language. Topics include the genetic affiliation of the Japanese language, sound system, word formation, syntactic structures, socio-cultural factors in language use, and historical development of the writing system. Students will become acquainted with the language from a linguistics perspective and develop analytical skills by solving linguistic problems pertinent to Japanese language. (Prerequisites: Minimum score of 2 on RIT Language Placement Exam or MLJP-202 or MLJP-202T or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

Foreign Languages—Portuguese**MLPO-201****Beginning Portuguese I**

Beginning Portuguese I introduces the Portuguese language and culture to beginners, and builds the foundation skills in speaking, listening, reading, writing and culture. Part of the SILP/World languages program. Based on Brazilian Portuguese, along with study of all Lusophone countries. Students must take placement exam if this is their first RIT class in Portuguese and they have some prior study of Portuguese. **Seminar, Credits 4 (Fall)**

MLPO-202**Beginning Portuguese II**

Beginning Portuguese II continues the first-year study of Portuguese language and culture, including work in the present tense, the past tenses, and introducing the subjunctive mood, continuing to build the foundation skills in speaking, listening, reading, writing and culture. Based on Brazilian Portuguese, along with study of all Lusophone countries. Part of the SILP/World languages program. Consult program coordinator if this is your first RIT Portuguese course. Students must take the placement exam if this is their first RIT Portuguese class and they have some prior study of Portuguese. (Prerequisites: Minimum score of 1 on RIT Language Placement Exam or MLPO-201 or equivalent course.) **Seminar, Credits 4 (Spring)**

MLPO-301**Intermediate Portuguese I**

Intermediate Portuguese I is the first course in the second year of Portuguese language study. Course content concentrates on intensive grammar review, situation dialogues, conversation, and cultural readings, and includes work in all five skills (speaking, listening, reading, writing, culture). Part of the SILP/World languages program: consult the program coordinator if this is your first RIT Portuguese course. Students must take the placement exam if this is their first RIT Portuguese class, and they have some prior study of Portuguese. (Prerequisites: Minimum score of 2 on RIT Language Placement Exam or MLPO-202 or MLPO-202T or equivalent course.) **Seminar, Credits 3 (Fall)**

MLPO-302**Intermediate Portuguese II**

Intermediate Portuguese II is the second course in the second year of Portuguese language study. Course content concentrates on intensive grammar review, situation dialogues, letter writing (business and personal), compositions, oral presentations, and cultural readings. Includes work in all five skills (speaking, listening, reading, writing, culture). Part of the SILP/World languages program: consult the program coordinator if this is your first RIT Portuguese course. Students must take the placement exam if this is their first RIT Portuguese class, and they have some prior study of Portuguese. (Prerequisites: Minimum score of 3 on RIT Language Placement Exam or MLPO-301 or equivalent course.) **Seminar, Credits 3 (Spring)**

MLPO-401**Advanced Portuguese I**

This is the first course of the advanced (third) year of Portuguese language and culture study. The course content is based on the first six films and the first two chapters of the textbook *Cinema For Portuguese Conversation* (Bonnie Wasserman, Focus Publishing, 2009). Course work covers the cultural themes, readings, grammar study, vocabulary, conversation and composition topics included in the book and the films. Practice in all five skills: speaking, listening, reading, writing, culture. Part of the SILP/World languages program. Consult program coordinator if this is your first RIT Portuguese course. Students must take the placement exam if this is their first RIT Portuguese class, and they have some prior study of Portuguese. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLPO-302 or equivalent course.) **Seminar, Credits 3 (Fall)**

MLPO-402**Advanced Portuguese II**

This is the second course of the advanced (third) year of Portuguese language and culture study. The course content is based on the last eight films and the last three chapters of the textbook *Cinema for Portuguese Conversation* (Bonnie Wasserman, Focus Publishing, 2009). Course work covers the cultural themes, readings, grammar study, vocabulary, conversation and composition topics included in the book and the films. Practice in all five skills: speaking, listening, reading, writing, culture. Part of the SILP/World languages program. Consult program coordinator if this is your first RIT Portuguese course. Students must take the placement exam if this is their first RIT Portuguese class, and they have some prior study of Portuguese. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLPO-401 or equivalent course.) **Seminar, Credits 3 (Spring)**

MLPO-449**Special Topics in Portuguese**

An in-depth exploration of the Portuguese language and culture focusing on skills/topics that are not covered in sequential regular language courses. Prerequisite: varies; contact the instructor. **Seminar 3, Credits 3 (Fall, Spring, Summer)**

Foreign Languages–Russian

MLRU-201

Beginning Russian I

Beginning Russian I introduces the Russian Language and builds foundational skills in speaking, listening, reading, and writing. Grammar is introduced within conversational topics. The course is very interactive and students learn how to communicate on selected topics, creating dialogues and acting out real world situations. Students who have prior knowledge in Russian should take placement test before enrolling into the class. **Seminar, Credits 4 (Fall, Spring)**

MLRU-202

Beginning Russian II

Beginning Russian II works on further development of communicative skills within conversational topics. Students learn more vocabulary and grammar and writing given topics are able to have conversations, read, and write in the target language. Students must take the placement exam and consult their program coordinator if this is their first RIT Russian class, and they have some prior study of Russian. (Prerequisites: Minimum score of 1 on RIT Language Placement Exam or MLRU-201 or equivalent course.) **Seminar, Credits 4 (Fall, Spring)**

MLRU-301

Intermediate Russian I

Intermediate Russian I starts the second year of Russian language study. Students learn new topics with more complex language structures. Students are prepared for speaking on the topics as well as constructing free conversations in Russian. Students continue to develop their functional skills on an intermediate level. Students must take the placement exam and consult their program coordinator if this is their first RIT Russian class, and they have some prior study of Russian. (Prerequisites: Minimum score of 2 on RIT Language Placement Exam or MLRU-202 or MLRU-202T or equivalent course.) **Seminar, Credits 3 (Fall, Spring)**

MLRU-302

Intermediate Russian II

Intermediate Russian II continues the second year of Russian language study. Students learn more new topics and continue developing conversational and functional skills on an intermediate level. They are able to have conversation on a variety of topics. Students are beginning to read more complex text and write essays on the topics. Students must take the placement exam and consult their program coordinator if this is their first RIT Russian class, and they have some prior study of Russian. (Prerequisites: Minimum score of 3 on RIT Language Placement Exam or MLRU-301 or equivalent course.) **Seminar, Credits 3 (Fall, Spring)**

MLRU-305 Intermediate Conversation and Intercultural Communication in Russian

This course develops students' skills in conversation at the intermediate level. Students will review grammar and vocabulary from the beginning level and continue to build on grammar, vocabulary, phrases, and other expressive skills. Students apply them in a variety of task/goal-oriented conversations to gain accuracy and more fluency. In doing so, students reflect upon the norms and communication strategies in the US or their own culture, and compare them with those in Russian society. (Prerequisites: MLRU-202 or equivalent course.) **Seminar 3, Credits 3 (Spring)**

MLRU-401

Advanced Russian I

Advanced Russian I, the first in the advanced (third year) sequence of Russian language courses, provides students with training in advanced-intermediate to advanced level work in all skills (speaking, listening, reading, writing), including conversation, with increased work in reading and writing. In addition students learn about Russian culture and history through articles that they read in the target language. See Coordinator of the World languages program if this is your first RIT Russian class. Students must take the placement exam if this is their first RIT Russian class, and they have some prior study of Russian or are heritage learners who need to improve their reading and writing skills. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLRU-302 or equivalent course.) **Seminar, Credits 3 (Fall)**

MLRU-402

Advanced Russian II

Advanced Russian II, the second in the advanced (third year) sequence of Russian language courses provides students with training in advanced level work in all skills (speaking, listening, reading, and writing). Students are able to participate in discussions, write essays, read articles and excerpts from the work of the Russian authors. Students continue to learn about Russian culture and history through articles. See Coordinator of the World languages program if this is your first RIT Russian class. Students must take the placement exam if this is their first RIT Russian class, and they have some prior study of Russian or are heritage learners. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLRU-302 or equivalent course.) **Seminar 3, Credits 3 (Spring)**

MLRU-405

Russian Language and Culture through Media

This course trains students in both learning about and learning through Russian language and culture using media. Students engage in learning about Russian cultural traditions, television, cinematography and art through watching movies and videos, exploring websites in the target language, reading, and holding discussions about, digital and written media. Students will broaden their vocabulary base and use them in discussions, conversations, and writing on the advanced level. They will also improve their listening by learning directly from authentic media materials. Students also expand their understanding of certain traditions and gain knowledge about Russian heritage such as cinematography and art. (Prerequisite: MLRU-302 or equivalent course.) **Seminar 3, Credits 3 (Fall, Spring)**

MLRU-449

Topics in Russian

An in-depth exploration of the Russian language and culture by focusing the skills/topics that are not regularly covered in sequential regular language courses. Prerequisite: varies; contact the instructor. **Seminar 3, Credits 3 (Fall, Spring, Summer)**

Foreign Languages–Spanish

MLSP-201A

Beginning Spanish IA

Beginning Spanish IA is for true beginners of Spanish: those who have never studied the language or have very little recollection of it (the latter as acknowledged by placement test results). This course introduces the Spanish language and the culture of Hispanic countries to beginners, and provides a basic foundation in all skills in Spanish (speaking, listening, reading, writing, culture) through intensive practice in a variety of media. Language work progresses from autobiographical information, through the present tense, to preliminary work in the past tenses. Students must take the placement exam if this is their first RIT class in Spanish and they have some prior study of Spanish. (Pre-requisite: Students must have a score of .88 on the Spanish Language Placement Exam.) **Seminar 4, Credits 4 (Fall, Spring, Summer)**

MLSP-201B

Beginning Spanish IB

This course is for students who have previously studied Spanish in high school or elsewhere but who do not know the past tenses as determined by placement test results. The course strengthens students' foundation in all skills in Spanish (speaking, listening, reading, writing, culture) through intensive practice in a variety of media. Language work progresses from autobiographical information, through the present tense, to preliminary work in the past tenses. Students must take the placement exam if this is their first RIT class in Spanish. (Prerequisites: Students must have a score of .99 of the RIT Language Placement Exam.) **Seminar 4, Credits 4 (Fall, Spring)**

MLSP-202

Beginning Spanish II

This course continues the basic grammatical structures, vocabulary and situations of first-year Spanish, with foundation work in all skills (speaking, listening, reading, writing, culture). Beginning Spanish II continues work in the past tenses and includes work on the subjunctive mood, plus the future and conditional tenses. Students work on paragraph-length speech and writing, and move toward readiness for conversation and composition. (Prerequisites: MLSP-201A or MLSP-201B or score of 1 on the placement exam or equivalent course.) **Seminar, Credits 4 (Fall, Spring)**

MLSP-301

Intermediate Spanish I

This is the first course in the Intermediate Spanish sequence (second year). Intermediate Spanish I is a course in Conversation, along with grammar review and culture study. Emphasis is on tourist survival situation dialogues, various forms of conversation, and registers of formality. The basic skills learned in the first year courses are now put into practice. Students must take the placement exam if this is their first RIT Spanish class, and they have some prior study of Spanish. (Prerequisites: Minimum score of 2 on RIT Language Placement Exam or MLSP-202 or MLSP-202T or equivalent course.) **Seminar, Credits 3 (Fall, Spring)**

MLSP-302

Intermediate Spanish II

This is the second course in the Intermediate Spanish sequence (second year). Intermediate Spanish II is a Composition course, emphasizing grammar review, composition, business-letter writing, Spanish for the Professions, and culture, while also including work in speaking and listening. The basic skills learned in the first year courses are now put into practice. In addition to the language work, there is significant work on cultural topics of Spanish-speaking countries at the intermediate level: both formal and informal culture (the arts and daily behavior). Students must take the placement exam if this is their first RIT Spanish class, and they have some prior study of Spanish. (Prerequisites: Minimum score of 3 on RIT Language Placement Exam or MLSP-301 or equivalent course.) **Seminar, Credits 3 (Fall, Spring)**

MLSP-305**Spanish for Health Care**

Students will acquire culture and communication skills related to health and the health professions in Spanish through experiential learning and primary sources including authentic audiovisual and written materials. This course includes a one-week experiential learning component in a Spanish-speaking community during spring break. A program fee and approved application are required. All students will present an original, culminating project through which they will share the results of this community-based learning experience. Topics covered include Communication Styles, Cultural Awareness, the Medical Interview, Anatomy, Vital Signs, Medical History, Nutrition, Illnesses, Symptoms, Allergies, Appointments, Test Results, Hospitalization, Surgery, Vaccinations, Dental Hygiene, Mental Health, Pregnancy, Sexual Health. (Prerequisites: Minimum score of 3 on RIT Language Placement Exam or MLSP-301 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MLSP-310**Spanish Grammar Review**

Spanish Grammar Review is an intensive review of the major grammar components of the Spanish language as typically studied by U.S. college students. Classroom exercises and discussion are supplemented by a textbook and online activity program. The course intends to help students progress in their language study and solidify their grammar skills. In addition to particular exercises in the textbook topics, weekly class work includes an open forum for questions and spontaneous exercises. (Corequisites: Minimum score of 2 on RIT Language Placement Exam or MLSP-202 or MLSP-202T or equivalent course.) **Seminar 3, Credits 3 (Spring)**

MLSP-315**Hispanic Culture and Civilization**

Hispanic Culture and Civilization, taught completely in Spanish, examines the history and cultures of the Spanish-speaking countries of the world. Detailed history, regional identities, regional characteristics, connections, similarities and differences, important historical events, cultural expressions, and contemporary issues are discussed, based on readings, documentary films, and research. (Prerequisites: Minimum score of 3 on RIT Language Placement Exam or MLSP-301 or equivalent course.) **Seminar 3, Credits 3 (Spring)**

MLSP-351**Gender and Sexuality in Hispanic Studies**

This course introduces students to the study of gender and sexuality in cultural production from the Hispanic world. Students will read, view, and discuss diverse works from a variety of historical periods and geographical regions that deal with gender identity, sexuality, and interrelated social movements. This course refines students' skills through discussions, presentations, and writing exercises on readings, lectures, and film screenings. Students will also develop research skills as they complete a project on a topic chosen in consultation with the instructor. The critical approach that will inform this course is feminist thought. **Lecture 3, Credits 3 (Fall)**

MLSP-352**Caribbean Cinema**

This course provides an introduction to Hispanic Caribbean culture through cinema studies. We will study the role of film in Hispanic Caribbean societies as well as the unique artistic and technical achievements and obstacles of Cuban, Dominican, and Puerto Rican filmmakers. Topics covered include: The Basics of Film Analysis; An Introduction to Caribbean Film History; The Social Context of the Hispanic Caribbean Film Industry; Art and Revolution; Race, Ethnicity, and Religion; Occupation, Dictatorship, and War; Gender, Sexuality and Exile; Transnationalism and Migration, and Hispanic Caribbean Film in a Global Context. This course will take a cultural studies approach to the study of film as a social practice. Weekly films (1.5-2 hours in length) must be watched outside of class hours. All films with dialog have English subtitles. **Lecture 3, Credits 3 (Spring)**

MLSP-353**Trauma and Survival in First-Person Narrative**

This course introduces students to first-person narratives about trauma and survival from Latin America, the Hispanic Caribbean, U.S. Latina/o communities, and Spain. Students will learn about Hispanic literature, culture, and history while exploring the themes of memory, community, and survival in autobiography, testimonial narrative, chronicle, memoir, epistolary narrative, essay, and the historical novel. Through in-class discussion, presentations, reading, and writing exercises, this course refines students' skills in oral expression, reading, writing, and critical thinking. Students will also develop research skills as they complete a project on a topic chosen in consultation with the instructor. **Lecture 3, Credits 3 (Spring)**

MLSP-401**Advanced Spanish I**

This is the first course at the advanced level. This sequence is designed to further develop proficiency in the four language skills of listening, speaking, reading, and writing. This sequence develops the ability to understand and communicate more freely by expansion of vocabulary and grammar, and by exposure to authentic cultural materials, both textual and visual. Students must take the placement exam if this is their first RIT Spanish class, and they have some prior study of Spanish. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLSP-302 or equivalent course.) **Seminar, Credits 3 (Fall)**

MLSP-402**Advanced Spanish II**

This is the second course at the advanced level. This sequence is designed to further develop proficiency in the four language skills of listening, speaking, reading, and writing. This sequence develops the ability to understand and communicate more freely by expansion of vocabulary and grammar, and by exposure to authentic cultural materials, both textual and visual. Students must take the placement exam if this is their first RIT Spanish class, and they have some prior study of Spanish. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLSP-302 or equivalent course.) **Seminar, Credits 3 (Spring)**

MLSP-410**Spanish for Science and Technology**

This course teaches specialized terminology and linguistic structures important for communicating scientific and technological knowledge in Spanish. The focus is on developing students' listening, speaking, reading, and writing skills in interpreting technical Spanish. Students will learn science and technology terms and structures in a broad range of technical areas via experiential learning activities. In addition, students will research and present topics of their own interest or beyond their disciplines. Students will expand their knowledge of Spanish to include technical terms and linguistic structures. This course will better prepare them to apply their language skills in internships, research, and work while exploring and understanding the culture of professional workplaces in the Spanish-speaking world. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLSP-302 or equivalent course.) **Seminar 3, Credits 3 (Annual)**

MLSP-415**Professional Spanish**

The course gives students an opportunity to study professional language and culture as well as to practice presentation and negotiation skills, especially in professional and formal contexts. Students will improve speaking, listening, reading and writing skills developed in the elementary/intermediate sequence to master formal interactions in Spanish. They will learn professional vocabulary, expressions, and grammatical structures through readings, conversation, and discussion. They will cultivate expressive skills through discussion, writing assignments, and a video tutorial project. This course will be useful for students who are planning to seek employment in international companies or in companies doing business abroad, and also for students who want to learn more about business in Spanish-speaking cultures. This is a language class; proficiency equivalent to Intermediate Spanish II is required. (Prerequisites: Minimum score of 4 on RIT Language Placement Exam or MLSP-302 or equivalent course.) **Seminar 3, Credits 3 (Annual)**

MLSP-431**Speaking and Culture Practicum in Spanish**

This one-credit course provides students opportunities to intensively practice and improve real-life speaking skills in the target language, beyond what is possible in regular language courses. Grammar relevant to each context and communicative goal may be reviewed as necessary. This course may also provide cultural information related to current events and daily life. Open to any students that meet the level required for each section or equivalent who desire extra practice. **Seminar 1, Credits 1 (Fall, Spring)**

MLSP-449**Topics in Spanish**

An in-depth exploration of the Spanish language and culture focusing on skills/topics that are not covered in sequential regular language courses. Prerequisite: varies; contact the instructor. **Colloquium 3, Credits 1 - 4 (Fall, Spring, Summer)**

Foreign Languages–Special Topics

MLST-449**Special Topic Modern Lng**

This upper-level course will focus on a specific theme or topic in modern languages, chosen by the instructor, announced in the subtitle, and developed in the syllabus. The topics of this course will vary, but the course number will remain the same, so be sure not to repeat the same topic. **Seminar 4, Credits 3 (Spring)**

History

HIST-101**Making History**

How do historians understand and interpret the past? What tools do historians use to uncover the past? What does it mean to think historically? History is both an art and a science, and in this course, we will learn the methods, practices, and tools used to create historical knowledge. You will learn how to read texts with an eye toward their argument, how to ask historical questions, how to conduct historical research, and how to write a historical narrative. At the discretion of the instructor, the class may use examples from a particular historical era to ground course concepts in a specific historical tradition. **Lecture 3, Credits 3 (Fall)**

- HIST-102** **Themes in US History**
This introductory-level course will examine the social, cultural, political, technological and/or economic development of modern America as it is revealed through a particular historical topic or theme. The theme or topic of the course is chosen by the instructor, announced in the subtitle, and developed in the syllabus. **Lecture 3, Credits 3 (Fall, Spring)**
- HIST-103** **The City in History**
This course offers an introduction to the study of history by exploring the history of a particular city. Cities are complicated places, where many peoples, cultures, and histories overlap and interact. Their histories are also shaped by many forces, such as economic, cultural, demographic, social, and sexual, operating at levels from local to national to global. Studying a city offers a window into the history of a local place as well as a nation. The choice of the city is left up to the individual professor. Cities under study in the past have included Rochester, Las Vegas, and Paris. **Lecture 3, Credits 3 (Spring)**
- HIST-104** **Themes in European History**
This course will examine variable topics within the scope of European history. In particular students will study the major European institutions, cultures, and societies as they have evolved throughout history, for example, the role of religion in European history, the rise of European nationalism, the age of discovery and colonialism/imperialism, or the various economic systems (feudalism, capitalism, communism, socialism). Students will also study Europe's relationship both with other European powers as well as with the wider world. **Lecture 3, Credits 3 (Annual)**
- HIST-105** **Themes in History**
This course is used solely for the purpose of transferring Advanced Placement credit for the AP history exams. This course may not be taken for credit. **Lecture 3, Credits 3 (Fall, Spring, Summer)**
- HIST-125** **Public History and Public Debate**
In late 1994, the B-29 Superfortress Enola Gay, the airplane that dropped the first atomic bomb detonated in combat on Hiroshima, Japan, arrived at the Smithsonian National Air and Space Museum in Washington, DC. The museum's staff faced important questions: Would they celebrate the Enola Gay as the weapon that ended the Pacific War? Would they exhibit it as a technological artifact that marked the dawn of nuclear warfare? Would they remind museum visitors that its potent cargo ended the lives of tens of thousands of people? These were difficult professional questions for public historians; they were deeply ethical questions too. Much of the past that public historians interpret is the source of great debate in the present. Since the way history is remembered shapes public policy, community identity, and collective understanding, the ethical stakes for public history are high. This course will examine notable controversies in American public history and develop students' critical perspectives on them. Students will generate answers to the questions: What are the ethics of doing public history? What happens when public historians remember, but the community wants to forget? When stakeholders (e.g., historic site, community, historians, sponsors) collide, whose stories and whose interests prevail? Who decides? How are those decisions made? Who is allowed to tell history? To whom or to what are public historians responsible? **Lecture 3, Credits 3 (Fall, Spring)**
- HIST-140** **History of the Modern Middle East**
This course aims to provide students with a general overview of basic themes and issues in modern Middle Eastern history. Such themes include the influence of the world on the Middle East, the various political, religious, and social movements in the Middle East, and cultural and civilizational aspects of Middle Eastern societies. This course will also study cultural encounters and exchanges between the Middle East and the rest of the world, including the era of colonialism and the nationalist reaction. And finally, students will gain an understanding of the many conflicts in which the Middle East is embroiled as well as their historical antecedents. **Lecture 3, Credits 3 (Fall, Spring)**
- HIST-150** **World History since 1500**
This course will explore of how the contemporary global order in the 21st century has emerged from the historical events, processes and trends of the past 500-plus years. Since 1500, the world has changed dramatically, from several mostly—or entirely—separate and autonomous regions to a single interconnected system of people and societies. We will consider the political, social, economic, and technological developments as well as the intercultural and transregional contacts and interactions that helped create these changes. **Lecture 3, Credits 3 (Biannual)**
- HIST-160** **History of Modern East Asia**
Understanding the history of East Asia is integral to understanding the complex world that we live in, and will help us to understand that no single nation can live in isolation. One cannot endeavor to understand limited national entities alone; rather one must understand the interactions between cultures and across borders that help to define the world. Japan, for example, cannot be adequately understood without reference to China, Korea, and one might argue, the wider world. Therefore, we will undertake in this course to examine the region of East Asia historically from about 1600 to the present, paying special attention to interactions between the cultures and people of the region. **Lecture 3, Credits 3 (Fall or Spring)**
- HIST-170** **Twentieth Century Europe**
This course examines major themes and controversies in European history from 1900 to the present, placing particular emphasis on the early 20th century crisis of liberal democracy and the political alternatives proposed to parliamentary government: right-wing nationalism, communism, and fascism. Topics will include: the impact of World War I on European societies and politics; Popular Front movements in France and Spain; eugenics and the Nazi racial state; the Holocaust; occupation and resistance during World War II; decolonization; student rebellions in 1968; Cold War domestic politics; and the reshaping of post-communist and post-colonial Europe. Special attention will be placed racial politics and immigration, state surveillance regimes, and European debates over the Americanization and globalization of European cultures. **Lecture 3, Credits 3 (Fall, Spring)**
- HIST-180** **Information Revolution**
The internet and cell phones seem to have revolutionized our society, changing how we learn about new things, relate to each other and understand ourselves. This course investigates the history of information and communication technologies to cast new light on these developments. We will ask how people formed political opinions, what ethical concerns new information and communication technologies raised, and how technologies changed the lives of the people using them. This course helps students understand the social, cultural, and ethical implications of revolutionary information and communication technologies. **Lecture 3, Credits 3 (Fall)**
- HIST-190** **American Women's and Gender History**
This course surveys women's history in the United States from the colonial period to present. The course moves chronologically and thematically, focusing on the diversity of women's experiences across race, class, and geography as well as the construction of dominant gender norms. Topics include Native American, African American, and Euro-American women in colonial America; the Industrial Revolution and the ideology of domesticity; Women in the American West; women's paid and unpaid work; sexuality and reproduction; women's activism; and women's experiences of immigration and family life. **Lecture 3, Credits 3 (Fall)**
- HIST-191** **The History of Families and Children in the U.S.**
The family is at the center of contemporary political debates involving social policies, gender roles, citizenship, marriage, and the role of the state. Politicians and commentators frequently invoke a mythical American family, one that is conflict-free, independent, and unchanging. These idealized depictions mask a far more complicated and richer historical reality of the development of family structures in the U.S. This course will examine both the diverse experiences of actual families in the American past, including queer families, and changing ideologies about the family and childhood. Students will have the opportunity to write a history of their own family, or to complete an alternative research paper. **Lecture 3, Credits 3 (Spring)**
- HIST-199** **Survey of American Military History**
This course is a survey of military history and will study the interaction between society and military institutions, technology and techniques, from 1637 to the present. Additionally, the course will examine the interrelationships of warfare, technology and society in American history. The course will focus on such questions as how changing styles of warfare, the composition of the military establishment (militias, citizen armies, paid professionals, mercenaries), and the transformations in military technology have impacted upon state and society. Conversely, it will also investigate how political and societal changes have influenced the nature of warfare in American history. **Lecture 3, Credits 3 (Fall)**
- HIST-201** **Histories of Globalization**
Globalization is a human process, influenced by contemporary and historical issues that are routinely conceived of as affecting or pertaining to the world's population in its entirety, such as human rights, humanitarianism, environmental degradation, trade, and military power. We use the world and its population as the unit of analysis with an emphasis is placed on issues that appear to be in tension with the role of the nation-state and nationality, and highlight world and global citizenship. We explore critiques of the conceptualization of globality and worldliness as a factor in determining social, cultural, and historical change. **Lecture 3, Credits 3 (Biannual)**
- HIST-210** **Culture and Politics in Urban Africa**
With a focus on African societies, we examine the diverse cultures of African peoples in the context of political and economic forces that have shaped their lives in the past and the present. Topics include European colonialism and its modern-day legacies, ethnic inequalities, economic vulnerability, labor migration, urbanism, and social unrest. We look at how art, music, oral traditions, and literatures have engaged critically with the forces of political change and neo-colonialism. We consider political activism, religious diversity, changing experiences and expectations of women and men, rebellion and revolution, impacts of and creative responses to globalization, and cultural transformations of African diasporas in the U.S and elsewhere. **Lecture 3, Credits 3 (Fall or Spring)**

HIST-221**Introduction to Public History**

Public history is using the research-based methods and techniques of historians to conduct historical work in the public sphere. If you've gone to a museum, conducted an oral history, researched your old house, or learned from an interpreter at a park or historic site, you've seen public history in action. This course will introduce students to the wide variety of careers in public history, and will examine the challenges and opportunities that come with doing history in, with, and for the public. **Lecture 3, Credits 3 (Spring)**

HIST-230**American Deaf History**

This course explores the history of the deaf community in the United States. It offers a broad survey of American deaf history from the early 19th century to the late 20th century. Major events in American deaf history will be considered, including the foundation of schools for the deaf, the birth of American Sign Language, the emergence of deaf culture, the challenge of oralism, the threat of eugenics, and the fight for civil rights. **Lecture 3, Credits 3 (Spring)**

HIST-231**Deaf People in Global Perspective**

This course explores the history of the deaf community in global perspective from the 18th to the 20th century. It takes a comparative approach, exploring the histories of deaf people from around the globe, including deaf lives in Central America, Europe, Africa, and East Asia. Special attention will be given to the major events in European deaf history, as Europe was the site for the first schools for the deaf in the history of the world, and the world's first documented deaf culture, in France, emerged there as well. The spread of deaf education, the rise of indigenous signed languages, the birth of deaf-hood, and the fight for human rights will all be placed in a global context. **Lecture 3, Credits 3 (Fall)**

HIST-238**History of Disability**

This course will explore the meaning of disability in the nineteenth and twentieth centuries. The course provides a cultural over-view of disability and seeks to explore the social construction of disability, with special attention given to the cultural, intellectual, personal, and social histories of disability. Disability in history has been many (frequently contradictory) things: acquired at birth and acquired by war; a reason to promote eugenic policies or a reason to promote civil rights legislation; a medical diagnosis or a personal identity; visible in the body (as in the case of amputations) or invisible (as in the case of deafness); a source of family shame or a source of personal pride. How has the meaning and nature of disability changed over time? How can we understand the cultural meaning of the body in history? The course seeks to explore and explain these shifting meanings of disability within the context of Western history. Specific topics to be considered include freak shows, disabled veterans, prosthetic technologies, disability as culture, the history of eugenics, and political activism. **Lecture 2, Credits 3 (Fall or Spring)**

HIST-240**Civil War America**

This class will examine American politics and society during the Civil War era. In addition to military affairs, students will focus on several broader themes, including the political, economic and social factors leading to the Civil War in the 1860s; the role of abolitionist, slave expansionist, and black freedom movements in the years before the Civil War; the development of emancipation policies during and after the war; and the reconstruction of the union following the war. Students will also examine the way subsequent generations of Americans remembered the Civil War in history books, memoirs, and museums. **Lecture 3, Credits 3 (Spring)**

HIST-242**The American Revolutionary Era**

This course will examine the American Revolutionary era as a key moment in both U.S. and global history. Focusing on the era between 1760 and 1800, the course will survey the key political, social, economic and cultural events in the founding and development of the United States as an independent nation. Key topics include debates over American independence, the development and meaning of civil society at the state and federal levels, debate over social issues such as slavery and women's equality, American foreign policy and global views of the American Revolutionary project and the formation of both the U.S. Constitution and political parties at the close of the 18th century. **Lecture 3, Credits 3 (Biannual)**

HIST-245**American Slavery and Freedom**

This class will survey the history of slavery and freedom in the United States from the establishment of global slave systems in the colonial period through emancipation movements during the Civil War era. Students will examine key economic, political, and social issues (from the development of slave labor systems to strategies of resistance among enslaved peoples) as well as the meaning of black freedom struggles during key eras (such as the American Revolutionary era and Civil War). **Lecture 3, Credits 3 (Fall)**

HIST-250**Origins of U.S. Foreign Relations**

This class analyzes the roots of U.S. foreign policy, beginning with the American Revolution and continuing through the Spanish-American War. It also examines the development of the United States from a small 18th century experiment in democracy into a late 19th century imperial power. Topics include foreign policy powers in the constitution, economic development, continental and overseas expansion, and Manifest Destiny. **Lecture 3, Credits 3 (Fall)**

HIST-251**Modern U.S. Foreign Relations**

This course examines the late 19th century emergence of the United States as an imperial power and its development into a 20th century superpower. Topics include U.S. politics and foreign policy, the influence of racial and cultural ideologies on policy, isolation, and intervention, the cold war, and the Afghanistan and Iraq wars. **Lecture 3, Credits 3 (Spring)**

HIST-252**The United States and Japan**

This class examines the U.S.-Japanese relationship from the perspectives of diplomacy, economics, and culture. Fluctuating sharply during its 150 years, this relationship has featured gunboat diplomacy, racial conflict, war, and alliance. The course investigates U.S.-Japanese relations in the contexts of modernization, imperialism, World War II, the cold war, and the 21st century. **Lecture 3, Credits 3 (Fall)**

HIST-255**History of World War II**

This course will cover the military, diplomatic, political, social, and cultural history of World War II. It will focus on the causes of the war, the battles that decided the war, the leaders (civilian and military) who made the key decisions, and how the war changed society. The purpose of the course is to acquaint students with the political, social, economic, military, and cultural history of WWII and that conflict's impact upon our own era. **Lecture 3, Credits 3 (Spring)**

HIST-260**History of Premodern China**

This course will examine critically the early history of China: the origins of China, the early mytho-historical dynasties, early imperial China, and finally the late imperial era, ending at roughly 1850. Students will be able to trace the relationship to the Chinese to various non-Chinese peoples, particularly the semi-nomadic peoples on the northern frontier. Students will also examine the way that China's long and complicated past has shaped its present, and how its relations to other peoples has shaped its modern relations to both its neighbors and the west. **Lecture 3, Credits 3 (Fall, Spring)**

HIST-261**History of Modern China**

China occupies a rather large place in the consciousness of most Americans. It is the most populous country in the world, it has one of the biggest economies in the world and, in many ways, China has been seen to be in direct competition with America. Whatever the truth of these ideas, it is clear that China will play a major role on the world stage for the foreseeable future. This class will seek to analyze the historical circumstances surrounding the rise of modern China. What were the conditions that led to the establishment of, first, Nationalist China, followed by the People's Republic; why did the communist government enjoy such popular support; what were China's relations with the outside world; and finally, what is the state of China today? These are all questions that we will seek to answer in this course. **Lecture 3, Credits 3 (Fall, Spring)**

HIST-265**History of Modern Japan**

This course will seek to examine critically the history and culture of Japan and will address many of the stereotypes and misunderstandings that are an inevitable part of Japanese studies. We will do this by examining a number of materials such as primary documents in translation, Japanese films, and art such as woodblock prints. In doing so, I will try to present as complete and balanced a picture of Japan's history and culture as possible. This will not only be useful in understanding Japan and its past, but will also help in understanding many of the important regional issues that are confronting us here in the modern world. **Lecture 3, Credits 3 (Fall, Spring)**

HIST-266**History of Premodern Japan**

This class will introduce students to the history of Japan from the earliest times to the opening of the country in the mid nineteenth century. Through a variety of readings, discussions, and lectures, we'll tackle issues such as the origin of the Japanese people, early state formation, Japan in the larger East Asian context, and the rise of the warriors. We'll also examine the unique dual form of government that existed in Japan from the twelfth century, consisting of rule by the imperial court as well as by the warrior class in Japan, the well-known samurai. And finally, we'll look at several of the modern myths of Japanese history and try to address them in a balanced, historical manner. **Lecture 3, Credits 3 (Fall, Spring)**

HIST-270**History of Modern France**

This course explores pivotal themes in French history from the French Revolution of 1789 to the present. Topics will include the French Revolution, Napoleon III's Second Empire, French imperialism, World War I and nationalism, World War II and the Vichy regime, collaboration and resistance, and the 1968 student rebellions. Special emphasis will be placed on the recurring tension between secularism and Catholicism in French society, the role of French republicanism in shaping historic and contemporary debates about citizenship, race, and immigration, and France's relationship with its former colonial possessions and the United States. **Lecture 3, Credits 3 (Fall)**

HIST-275 Screening the Trenches: the History of WWI Through Film

This course uses popular films to examine World War I as the global conflict that set the stage for the rise of communism, fascism, and subsequent wars in twentieth-century Europe. Students will gain an understanding of the major causes and outcomes of World War I while investigating how the war transformed class, gender, and racial politics in Europe. Special attention will be paid to the combat/trench experience, the home front/war front divide, the German occupation of Belgium and Northern France, “total war,” the politics of shell-shock and disability, and the legacies of grief, mourning, and commemoration. Because World War I so greatly divided its participants, little consensus about the war’s meaning emerged in its aftermath. Filmmakers have consequently used World War I as a blank slate on which to project political fantasies, condemn elements of their own societies, or imagine the future. Students will use secondary historical literature and original primary sources to analyze filmic representations of World War I and consider how filmmakers have deliberately misrepresented the past or constructed particular narratives about the war to serve their own ends. This course will therefore equip students to think critically about representations of the historical past in popular culture. **Lecture 3, Credits 3 (Spring)**

HIST-280 History of Modern Germany

This course covers major themes in German history from the formation of the German Empire in 1870 to the present. Topics include nation building and nationalism, industrialization and urbanization, imperialism at home and abroad, the first world war, the Weimar Republic, Nazi racism and the second world war, the divided Germany and the Cold War, and reunification and the fall of the Berlin Wall. The course may focus on specific questions such as gender, class, religion or race and ethnicity. This course leads you to explore how German history shaped the role of Germans and Germany in the world today as well as how it informs problems facing other regions and eras. **Lecture 3, Credits 3 (Fall)**

HIST-281 Global History of Technology

Modern technologies make our daily lives pleasant and convenient; yet, many people around the globe lack access to these technologies. In this course, we will examine the origins and implications of technical developments throughout human history and across the globe—from digging sticks and pyramids, cathedrals and steam engines to atom bombs and electronic computers. We will consider the circumstances in which innovations emerge and move from one location to another, discuss how technologies influence the ways humans understand themselves, and examine how they affected the relations between different societies throughout history. In this course, you will gain a better understanding how societies around the world have shaped their technologies, and how technologies in turn have shaped them. **Lecture 3, Credits 3 (Fall)**

HIST-282 Women, Gender, and Computing

Popular attention often focuses on a few prominent women in computing history, such as Ada Lovelace, Grace Hopper, and the ENIAC programmers. But many more women were part of this history: as inventors, programmers, operators, and users of information and communication technologies. Investigating their legacies, we will discuss in this course how computing turned into an increasingly masculine field, what it meant for women and men to work in a male-dominated field, how the gendering of computing technologies and algorithms affected the identities and lives of their users, and how gender intersected online and offline with other dimensions of diversity, such as class, race, and ability. This course provides the theoretical concepts and historical overview that allow for a historically informed discussion of women, gender, sexuality, and computing today. **Seminar 3, Credits 3 (Spring)**

HIST-290 U.S. History Since 1945

This class examines U.S. history from WWII to present, with emphasis on political, social, and cultural change. Focuses on the meanings and boundaries of American citizenship, as well as the role of the U.S. in the world. Topics include the Cold War and McCarthyism; the GI Bill and the building of a suburban middle class; consumer culture and its critics; The Civil Rights Movement; Great Society liberalism; The Vietnam War, the New Left and the New Right, and the counterculture; feminism, the Religious Right, and changes in gender roles, sexuality and family life; deindustrialization and economic restructuring; globalism and immigration policy; the War on Drugs and the growth of a penal state; the end of the Cold War and the New World Order; and the War on Terror. **Lecture 3, Credits 3 (Spring)**

HIST-301 Great Debates in US History

This course offers an analysis and interpretation of the main themes in the history of the United States over a broad period of time that extends to the modern era. We will look at how issues such as race, class, gender, and the environment have shaped American history, as well as debates over the multiple meanings of that history. **Lecture 3, Credits 3 (Biannual)**

HIST-302 Topics in History

This upper-level course will focus on a specific theme or topic in history, chosen by the instructor, announced in the subtitle, and developed in the syllabus. The topics of this course will vary, but the course number will remain the same, so be sure not to repeat the same topic. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

HIST-310 Global Slavery and Human Trafficking

This course examines historical and contemporary dimensions of global slavery and human trafficking. The trans-Atlantic slave trade was the world’s largest forced migration between continents, but it was only one of many slave trades that shaped societies throughout the world. In order to understand the historical significance of global slave trades, we will compare it to other systems of slavery. In examining the historical significance and legacies of the slave trade, we will link different regional histories to the growth of market-based capitalist economies into the 20th century. The course will also examine the changing meaning of the term ‘slavery’ and examine some modern forms of forced labor, bondage, and slavery that persist to this day in all sectors of the global economy. We will explore the rise of human trafficking, and global anti-trafficking programs and campaigns. **Lecture 3, Credits 3 (Fall or Spring)**

HIST-321 Special Topics in Public History

Public history is the practice of history for, and by, audiences outside the classroom. This course will focus on a specific theme or topic in public history, chosen by the instructor, announced in the subtitle, and developed in the syllabus. The topics of this course will vary, but the course number will remain the same, so be sure not to repeat the same topic. **Lecture 3, Credits 3 (Spring)**

HIST-322 Monuments and Memory

Monuments are physical objects that were constructed to help us remember the past, but a deeper analysis reveals that the relationship between monuments and the memories they embody is complex and changes over time. We will tackle the process of memorializing, the monuments that result, and seek greater insight into the arguments these artifacts make about the past, the present, and our place in the world. **Lecture 3, Credits 3 (Fall)**

HIST-323 America’s National Parks

The National Parks are some of America’s most treasured and spectacular landscapes, but even these wild places are the product of historical forces. In this class, we will explore the history of America’s National Parks, and use these spaces to unpack the relationship between Americans, their land, and their history. **Lecture 3, Credits 3 (Spring)**

HIST-324 Oral History

Oral history collects memories and personal commentaries of historical significance through recorded interviews. There are few opportunities for historical research that are more satisfying or more challenging than oral history. In this class, we will learn about oral history methods, techniques, and ethics. We will read, listen to, and watch some of the finest examples of the genre. Then we will go out and add to the world’s understanding of its past by conducting oral histories of our own. For their final project in this course, students will work in teams to produce a podcast based on their own interview(s). **Lecture 3, Credits 3 (Fall)**

HIST-325 Museums and History

Many more people learn history from museums than from textbooks. What is it that is so special about encountering the real thing in a museum? Why are Dorothy’s Ruby Slippers the most visited artifact in the National Museum of American History? Do history museums themselves have an important history? Join us as we investigate the connections between our history, our museums, and the material artifacts that tell historical stories. **Lecture 3, Credits 3 (Spring)**

HIST-326 Digital History

Computers and their networks have fundamentally altered the ways that history is both produced and consumed. Sources in digital formats simultaneously present opportunities and challenges that force us to rethink what is possible in history. Doing history in a digital age forces us to engage with the issues and opportunities raised by such as topics as digitization and preservation, text mining, interactive maps, new historic methodologies and narrative forms, computational programming, and digital storytelling. Digital tools, including blogs, wikis, video sharing sites, and many others, help bring history to new audiences in different ways. In this course, we will investigate the landscape of digital history and tackle the exciting task of understanding and creating history in the digital age. **Lecture 3, Credits 3 (Spring)**

HIST-330 Deafness and Technology

The deaf community has a long and complicated relationship with technological devices. The deaf community, for instance, was quick to embrace the new technology of moving pictures, and many deaf actors found work in early Hollywood during the silent film era. Most lost their livelihoods when sound was introduced to motion pictures. Deaf people were left out of the communication revolution brought about by the telephone for many years, but now the deaf community is increasingly a wired community, as texting, tweeting, and vlogging makes more communication technologies accessible to deaf users. This course will explore the historical relationship between technology and deafness. It will consider how views of deafness frequently shape technology, that is, if deafness is viewed as a pathological illness, technologies are focused on curing it (e.g., cochlear implants), whereas, if deaf people are viewed as members of linguistic and cultural minority, technologies are harnessed to make it easier for that minority to interact with the majority culture (e.g. relay systems). This course will consider how deaf people have historically used, created, and adopted technologies to their own ends. **Lecture 3, Credits 3 (Spring)**

HIST-332**Diversity in the Deaf Community**

Students in this course will be introduced to the historical study of diversity in the Deaf community, especially as it relates to issues of race, ethnicity, gender, disability, and sexuality. Students will learn to analyze the implications of such diversity in terms of the social perception of deaf people, the history of the education of deaf people, and the experience of acculturation for and as Deaf people. The course will examine how the process of acculturation has operated, historically, within the Deaf community. Deaf culture has sought to transcend various differences and to bond members of the Deaf community together, in one, larger Deaf identity. But has this always been achieved? How has the Deaf community handled issues of diversity in different historical moments? Has the history of diversity within the Deaf community been similar to the history of diversity within the hearing community? Or have there been distinctively Deaf ways of diversity in history? This course will invite students to compare and contrast the history of difference and diversity in the deaf and hearing communities, and to explore those historical moments of intersection and interaction as well. **Lecture 3, Credits 3 (Fall)**

HIST-334**Oppression in the Lives of Deaf People**

Students in this course will examine various forms of oppression across different cultures and communities. Students will analyze the influence of oppression on minority groups with respect to resistance and the struggle for social justice. Finally, students will examine and apply experiences of other minority groups in recent history to the Deaf community. **Lecture 3, Credits 3 (Fall)**

HIST-335**Women and the Deaf Community**

Deaf history, as a field, has often neglected the story of deaf women. Scholar Arlene B. Kelly has recently asked, Where is deaf herstory? This course seeks to correct that gender imbalance in deaf history. We will study deaf women's history. This will include a consideration of deaf-blind women, as well, as women like Helen Keller were often the most famous deaf women of their era. But this course also seeks to look at the role of hearing women in deaf history. Hearing women dominated the field of deaf education in the late nineteenth century. They had a tremendous impact on the lives of deaf children and the events of deaf educational history. Hearing women were also important figures in deaf history as mothers. As mothers of deaf children, hearing women were frequently asked to behave as teachers in the home. Their embrace of this role often led them to endorse oral education, and oppose the sign language. Hearing mothers in this way were pitted against their adult deaf daughters, who frequently went on to learn sign language against their mothers' wishes. The historically complex relationship between women and the deaf community will be explored in this course. **Lecture 3, Credits 3 (Biannual)**

HIST-340**Rochester Reformers: Changing the World**

This course will survey Rochester area social reformers who led a number of critical reform movements, identifying problems with the status quo and proposing solutions to those problems. They worked to establish a new social order and even to perfect society. As an Erie Canal boom town and major manufacturing hub, Rochester inspired generations of famous reformers who made principled arguments for improving urban life and labor relations, ending slavery and securing civil rights for African Americans, and claiming equality for American women. Students will study the historical impact of celebrated social reformers such as Frederick Douglass and Susan B. Anthony as well as less well known figures like religious revivalist Charles Finney, urban park reformer Charles Mulford Robinson, and advocate of the social gospel Walter Rauschenbusch. The course will also introduce contemporary efforts that have attempted to reshape principles of social justice locally and nationally. In the 20th century the social reform movement efforts turned to the ethical and social problems of a modernizing America, debating solutions to the pressing problems of urbanization, immigration, and environmental protection. Students will also work on a community-based research project focusing on the history and impact of particular Rochester reformers. **Lecture 3, Credits 3 (Spring)**

HIST-345**Environmental Disasters**

This class will survey the history environmental disasters (from floods to oil spills) in modern American and global society. Students will study several specific disasters (for example, Hurricane Katrina, the Great Midwestern Floods of the 1990s, Love Canal, and the Haitian Earthquake of 2008) and analyze a series of broader themes that illuminate their meaning, including the economic impact of various disasters, the legal and political ramifications of modern disasters, and the social and cultural meaning of disasters in various societies. **Lecture 3, Credits 3 (Fall)**

HIST-350**Terrorism, Intelligence, and War**

This course investigates the historical, political, moral, and legal dimensions of terrorism, intelligence, and war. It uses a case-study approach with themes that include just war theory, terrorism in the colonial and post-colonial worlds, domestic terrorism, and mechanisms of intelligence and covert operations. **Lecture 3, Credits 3 (Spring)**

HIST-351**The Vietnam War**

The Vietnam War continues to loom over American history. In the service of vastly different causes, politicians repeatedly invoke it: some define it as a tragic mistake, others as a noble cause. Many search for the lessons of Vietnam, a war that cost more than 58,000 American lives and as many as three million Vietnamese. In this course, we consider the war experiences of both the United States and Vietnam. We begin by highlighting Vietnamese history, culture, nationalism, communism, and independence. After analyzing Vietnam as a colony under the French, we turn our attention to American involvement beginning in the early years of the Cold War and ending with the fall of Saigon. Although we examine military and political history, the course also emphasizes social and cultural perspectives on a war that tore at the fabric of American society and led ultimately to the downfall of two presidents. Last, we look at the war's enduring legacies in the United States and Vietnam today. Readings and assignments for the course include government documents, memoirs, fiction, film, and secondary literature from both nations. **Lecture 3, Credits 3 (Fall)**

HIST-355**The Holocaust: Event, History, Memory**

In the midst of the Second World War, under the auspices of the National Socialist regime in Germany, Germans along with their allies and collaborators murdered roughly six million European Jews and countless numbers of other "undesirables, including homosexuals, Slavic peoples, and gypsies. This much is incontrovertible, but only in subsequent decades did this series of events become known as the Holocaust. In this course we will cover not only the historical context and potential causes of the Holocaust—from the long history of European anti-Jewish and antisemitic violence to the specifics of National Socialist racial ideology—and the events themselves—the persecution, ghettoization and eventually extermination of Jewish communities across occupied Europe—but also consider the long afterlife of this historical fact. Why (and how) has the Holocaust become a critical episode in both European and global history? How have the books and films released in the years after 1945 influenced our collective consciousness of that period of European history? Why have the most notable location of mass murder, the camp at Auschwitz in southern Poland, a memorial in the center of the German capital of Berlin, and a museum dedicated to the Holocaust in Washington, DC, become major tourist destinations? How have our contemporary understandings of genocide and human rights emerged from this series of events? Why are there still thousands of people invested in denying that these events ever happened? **Lecture 3, Credits 3 (Biannual)**

HIST-360**A Global History of Baseball**

Baseball has been called America's game, and the late, great historian Jacques Barzun once quipped that in order to understand the soul of America, one first had to understand baseball. This may be true about America, and if so, then it is equally true for many other areas of the world. Baseball, since the nineteenth century, has been an integral part of not just America's sports culture but also that of countries from Japan to Taiwan to Venezuela to the Dominican Republic. This course will examine the origins of baseball from English bat and ball games such as Rounders, American missionaries introducing the game to Japan and Korea, baseball as a nationalist reaction to Spanish rule in Cuba, and, finally, the global reach of modern baseball as seen in such classic institutions as the Little League World Series. **Lecture 3, Credits 3 (Fall, Spring)**

HIST-365**Conflict in Modern East Asia**

The 20th century has sometimes been called the Pacific Century, which is ironic since this period of time has been anything but pacific! The twentieth century saw the rise of four great pacific powers; the U.S., Japan, China, and the Soviet Union, and saw the eclipse of several others, including the British and French Empires. Furthermore a major front of the Cold War was played out on the Asian continent, namely the Korean and Vietnam wars, as well as the U.S. standoff with Communist China. And of course the Second World War, the greatest concentrated period of human destruction, played out at the midpoint of the twentieth century. This class will analyze these conflicts both as conflicts in and of themselves, but will also look at the backdrop against which these conflicts were played out. Beginning with the subjugation of China in the 19th century, our class will examine the many conflicts that defined this region through the end of the twentieth century. **Lecture 3, Credits 3 (Fall or Spring)**

HIST-369**Histories of Christianity**

The history of Christianity is not simply the history of the religion of the west. Rather, Christian history is a long and complex movement that has profoundly affected Asia, Africa, Europe, and the New World. At various times there were several competing ideologies of Christianity, of which the west's was only a single example. Christianity also has a long history of interacting with other religions, from Zoroastrianism and Manichaeism to Judaism and Islam. This course will trace the development of Christianity paying special attention to how the Christian tradition developed in places such as Africa and Asia. We will, of course, also study Christianity in its western forms, but we will make an effort to dive into the rich tradition of this religion in all its many forms. **Lecture 3, Credits 3 (Fall or Spring)**

HIST-370

Global History of Religions

This course will examine the history of the world's larger religious traditions, including origins, development in particular societies, and modern forms. This course will explore the formal doctrines of various religions, as well as popular cultural manifestations. Topics will include the role of religion in state formation, nationalism, and colonialism, as well as how religions adapt themselves to local cultures and societies as they spread across regions. **Lecture 3, Credits 3 (Annual)**

HIST-380

International Business History

This course provides an overview on the history of international business since the late 19th century. We will examine social change over time in how corporations have handled expansion into foreign markets, why corporations decided to – or not to – expand abroad, how they managed their foreign operations, and what contributed to their success or failure abroad. To do so, we will look at a variety of factors including how corporations dealt with corporate communication, local regulations, transfers of knowledge and technology, and how corporate decisions affect communities. We will apply these historical insights to case studies of multinational corporations. **Lecture 3, Credits 3 (Spring)**

HIST-381

Technology in the Modern World

Trains, planes, automobiles, phones and computers – modern technologies like these make our daily lives pleasant and convenient. Yet, many people around the globe lack access to these technologies. In this course, we will investigate the emergence of industrial manufacturing processes in late 18th century Britain that allowed for the development of these technologies. We will also examine how new technologies spread to other places in the world, how they shaped colonial relations, and what role they play in today's developing world. In this course, you will gain a better understanding of how people around the world have shaped their technologies, and how technologies in turn have shaped them. **Lecture 3, Credits 3 (Spring)**

HIST-383

Technology and Global Relations in the American Century

This class explores the role of technology in US foreign relations during the twentieth century, when the United States rose to global power. American engineers, scientists, missionaries, executives, and diplomats used technologies to gain strategic advantages, uplift other peoples around the globe, or open new market opportunities. We will look at how Americans employed a wide range of military, development, and consumer technologies, from torpedoes and airplanes to dams, schools, automobiles, and computers. Technologies projected superiority and served in civilizing missions; they also often reflected on relations of power, gender, and race. Sometimes, technologies moved freely from one place to another, and at other times their circulation was impeded. Based on historical sources and assigned readings, the class discussions will investigate how technologies shaped US foreign relations and were in turn shaped by them. **Seminar 3, Credits 3 (Fall)**

HIST-390

Medicine and Public Health in American History

This course introduces students to the social and cultural history of medicine by examining differing concepts of disease, health, and healing throughout American history. Themes include the professionalization of medicine, the role of science in medical research and practice, popular understanding and experience of health and illness, and the role of the state in providing medical care. We will explore how science and medicine defined social categories of difference, including race and gender, and how these categories in turn shaped medical thought and practice. The course format combines lectures, discussions, and films and readings include historical documents and case studies. **Lecture 3, Credits 3 (Spring)**

HIST-402

Special Seminar in History

This upper-level small group seminar will focus on a specific theme or topic in history, chosen by the instructor, announced in the subtitle, and developed in the syllabus. All sections of this course are writing intensive. The topics of this course will vary, but the course number will remain the same, so be sure not to repeat the same topic. **Seminar 3, Credits 3 (Fall, Spring)**

HIST-421

Hands-on History

Get hands-on experience researching, interpreting, and writing history. The class will tackle a common historical theme (announced in the subtitle), then do original historical research on a topic of your choice within the overall theme. Our themes do not just rehash old topics with little new information to uncover. Instead, we focus on relatively unexplored areas of the past, where your research can shed new light on unknown topics. You will learn about history by doing it! All majors are welcome. **Lecture 3, Credits 3 (Spring)**

HIST-430

Deaf Spaces

History, and particularly Deaf history within a predominantly hearing world, is the product of a vast network of inter-related spaces, in which more or less well-defined knowledges and cultures are performed. This course will provide students the opportunity to learn skills to identify and describe the different spaces – produced by both Deaf and hearing people – that have contributed to a 'history of the Deaf community'. It will equip students with the ability to not only identify and describe the histories of the Deaf community, but also to critically explore the meta-historical narratives that shape those histories, allowing them to situate those narratives within the wider evolution of social and cultural representation. Deaf Geographies reside at the intersection of Human Geography and Deaf Studies. It considers spatiality, language, citizenship, education, and identity, as well as other themes of interest in new ways by viewing these through the eyes of a community who perform their cultural and social geographies in the visual. (Prerequisite: 2nd - 4th year standing.) **Lecture 3, Credits 3 (Summer)**

HIST-431

Theory and Methods of Deaf Geographies

The course is designed to give students theoretical and practical exposure to qualitative social science applied research methods in a new area of human geographic and Deaf Studies research: Deaf Geographies. Deaf Geographies reside at the intersection of Human Geography and Deaf Studies. It considers spatiality, language, citizenship, education, and identity, as well as other themes of interest in new ways by viewing these through the eyes of a community who perform their cultural and social geographies in the visual. The focus of the course is an instructor-led research project. Students will gain a grounding in appropriate methodological theory in order to conduct hands-on, primary research that will include proposal writing, data collection, analysis, and dissemination. (Prerequisite: 2nd - 4th year standing.) **Lecture 3, Credits 3 (Summer)**

HIST-439

Biography as History

This course will look at biography as a form of history. By studying biographies that approach their subjects with various formats and methods of presentation, the class will examine how the craft of biography shapes our contemporary understanding of the historical past. Among the questions to be examined in this course are: how does biography reveal the historical circumstances of the subject's life to give readers a broader understanding of the historical context of that life? How effectively can contemporary readers explore the past through the prism of one person's life? Can the history of an era be effectively told through an examination of one person's life? What are the benefits of the biographical approach to history? What are the drawbacks? What are the benefits of biography as a form of public history? That is, when people can get their history through the Biography Channel, how important is it for public historians to grapple with the impact of biography as a form with a unique grip on the public imagination? **Lecture 3, Credits 3 (Biannual)**

HIST-450

Japan in History, Fiction and Film

An introduction to Japanese history, highlighting social and aesthetic traditions that have formed the foundations for Japanese literature and cinema. Explores how writers and directors have drawn on this heritage to depict historical experiences. **Lecture 3, Credits 3 (Spring)**

HIST-462

East-West Encounters

The Age of Discovery, beginning in the 15th century and culminating with the advent of European imperialism, is one of the most fascinating, as well as problematic, periods in the history of both Asia and Europe. Too often historians frame the interaction between Asia and Europe in uniquely European terms and present Asia as a passive partner in this process of discovery. In fact, this period presents us with a number of complex issues such as national identity, the nature of European expansion, and the Asian response to European journeys to the East. This course will undertake to re-examine the age of discovery not only from a European point of view, but also from an Asian standpoint. In the process, we will see how many of the issues that we are facing in the region are products of a long and complex relationship between Europe and Asia. Students will also examine the issues that have arisen between the east and the west in the twentieth century and that continue into our own time. **Lecture 3, Credits 3 (Fall, Spring)**

HIST-465

Samurai in Word and Image

One of the most enduring images of premodern Japan in the samurai, replete with sword and armor. This course will seek to examine the role of the samurai in Japanese history, examining popular perceptions in Japanese film, woodblock prints, and texts. We will also use a variety of secondary sources to critically examine some of the portrayals of the samurai and how they stand up to historical reality. Students will be encouraged to participate in extensive discussions as we deal with a great variety of media and try to arrive at an image of the samurai that is historically accurate. And finally, we will examine issues such as feudalism and the warrior code and how those historical concepts relate to the west at about the same time period. **Lecture 3, Credits 3 (Fall, Spring)**

HIST-470**Science, Tech, and European Imperialism: 1800-1965**

Between 1800 and 1945, Western nations dominated approximately three-quarters of the earth's surface through imperialism. This course examines how industrialization, technological developments, and the emergence of the modern sciences facilitated Europe's conquest and colonization of vast territories overseas. The course opens with a brief overview of the role of biology and science in shaping early imperial encounters (the Columbian Exchange). Students will then consider how 19th-century botany, zoology, acclimatization, cartography, geography, and anthropology became imperial sciences that facilitated formal conquest by producing knowledge about distant cultures, races, and environments. The Industrial Revolution produced new technological tools--steamboats, railroads, and weapons--that facilitated the Scramble for territory in the late 19th century. The course will consider how these inventions shaped patterns of conquest and colonial rule in the late 19th and early 20th centuries. Throughout the course, students will interrogate how Europeans' faith in the superiority of Western technology, scientific knowledge, and medicine shaped the evolution of the European civilizing mission--the cultural and political logic that defined interactions between Europeans and non-Western populations. At the same time, they will evaluate how Africans and Asians experienced living under colonial rule, and in some cases, how they deployed Western technology as weapons of resistance to imperialism. **Lecture 3, Credits 3 (Spring)**

HIST-480**Global Information Age**

The internet and cell phones seem to have turned us into world citizens of cyberspace. Programmers in Bangalore or Chennai now write software for U.S. companies, and doctors in India or Australia interpret the Cat-Scan or MRI images of US patients overnight. As best-selling author Thomas Friedman argues, the world is flat, that is competition for intellectual work is now global. Others have suggested that information technologies have led to global homogenization, with people around the world reading the same news, listening to the same music, and purchasing the same products. In this class, we will investigate the history of information and communication technologies to cast new light on these claims about our present-day technologies. This class is a small seminar which includes a research project. **Lecture 3, Credits 3 (Spring)**

HIST-497**History Internship**

A semester or summer-length experience in a professional setting related to the History major, with a minimum of 200 hours. (At least 2nd year and department approval required.) (Prerequisites: This class is restricted to students with at least 2nd year standing.) **Internship, Credits 0 - 3 (Fall, Spring, Summer)**

HIST-499**History Co-operative Education**

A semester or summer-length experience in a professional setting related to the History major, with a minimum of 200 hours. (At least 2nd year and department approval required.) (Prerequisites: This class is restricted to students with at least 2nd year standing.) **CO OP, Credits 0 - 12 (Fall, Spring, Summer)**

HIST-501**Capstone Seminar**

The capstone seminar is the final core requirement in the history degree program. Students will enroll in this course in their final year of study. The capstone seminar will further develop and sharpen the student's practice and understanding of the discipline of history. Students will work closely with faculty as they conceive of, develop, and revise a written senior thesis. And finally, students are expected to present their research project in front of their peers and program faculty. (Prerequisites: This class is restricted to students with at least 4th year standing.) **Seminar 3, Credits 3 (Fall)**

HIST-502**Advanced Research in History**

This course is an elective sequence to the capstone seminar. Upon successful completion of the capstone seminar, qualified students may engage in enhanced research under the supervision of and collaboration with a faculty member. Students will further explore and investigate their senior project or will work with a faculty member on a piece of original research for which the student will be the primary author. **Lecture 3, Credits 3 (Spring)**

HIST-599**Independent Study**

A student may register for an independent study project subject to the approval of the faculty sponsor, student's department, the academic committee of the college of liberal arts and the dean of the college of liberal arts and providing that she or he has a minimum GPA of 2.7 at time of application. An independent study project is not a substitute for a course. It enables the interested student and his or her faculty sponsor to coordinate their efforts on subjects and topics that range beyond the normal sequence of course selection. **Ind Study, Credits 1 - 3 (Fall, Spring, Summer)**

Interdisciplinary-Liberal Arts**ITDL-099****Career Preparation for Liberal Arts Majors**

This course will support liberal arts students in developing a career plan and developing core job search skills. The course will start with career exploration exercises to connect interests, skills, and values to their studies and the variety of ways they can be applied to the world of work. Students will acquire effective tools and strategies to conduct an internship, co-op, or full-time employment search. Upon successful completion of this course, students will have identified a primary career/job search goal, a targeted cover letter and résumé, a professional online profile, and the essential skills for networking and interviewing. The graduate school application process will also be covered for students seeking a master's degree and/or doctorate. Lectures will be combined with classroom activities and independent assignments. **Lecture, Credits 0 (Fall, Spring)**

ITDL-100**Being Human**

This course pairs classic works in philosophy, politics, and literature with weekly practical experiments in living in order to develop a framework for living a meaningful, well-examined life in the modern world. Great Works come alive as centerpieces for discussion about and shaping of personal character, and the development of a variety of skills, from simple time management (using, for example, Benjamin Franklin on habit formation) to relationship growth (for example, through Kierkegaard on love). The course also incorporates modern research on effective studying, learning, and self-care. Students will use Great Works to inform explorations of themselves, campus, and the Rochester community. **Lecture 3, Credits 3 (Fall)**

ITDL-101**Career Exploration Seminar**

This seminar is designed to introduce students to the process by which they can make an informed decision in selecting career options and identifying an educational program which will lead to their career goals. With the assistance of facilitators familiar with assessment instruments, careers and the RIT programs, students begin by assessing their interests, values, skills and personal traits. Students will be introduced to online and print resources used for researching occupational information and may be asked to interview faculty and administrators as well as professionals working in fields in which they are interested. Students will complete a variety of activities including class discussions, journal entries, papers and presentations, allowing them the opportunity to reflect on information gathered throughout the course. Students in the university studies and liberal arts exploration programs are required to complete this course successfully in the first term of their program. (This course is restricted to LAU-UND and UNIVST-UND Major students.) **Seminar, Credits 1 (Fall, Spring)**

ITDL-151H**Explorations of Place and Space**

This honors seminar is a foundational course that examines how our social worlds are linked to our natural and built worlds. The corresponding emphasis on inquiry, analysis, and interpretation facilitates student-engaged learning. In exploring pertinent place and space related issues/topics through an experiential, active, and site-specific curricular focused learning, various aspects of the human condition are discovered. The theme or topic of this honors seminar, as chosen by the instructor, is announced in the subtitle as well as course notes and is developed in the syllabus. The honors seminar integrates the required Year One curriculum. (This class is restricted to students in the Honors program.) **Lecture 3, Credits 3 (Fall)**

ITDL-205**Grand Challenges: Clean Water**

We face grand challenges in the 21st century that will test our collective intelligence and resourcefulness — global change, new diseases, the need for access to clean water, technological developments that are changing us and our relation to the world. We have the opportunity to transform our future through innovation and leadership, but we need to improve our critical thinking, innovate towards possible solutions, and work across disciplines to meet these common challenges. This course is therefore open to all students with the curiosity, imagination, and commitment to meet such challenges. We need engineers, scientists, public policy specialists, and humanists — individuals from every field of study and endeavor -- to contribute to global efforts to meet these challenges. One of the most important challenges of our time — and one identified by the National Academy of Engineers as among fourteen Grand Challenges — is that of providing access to clean water to people across the globe. This course focuses on this grand challenge through interdisciplinary links between the liberal arts and engineering. Students will work in teams to analyze the scope of the clean water problem, examine real case studies, trouble shoot observed problems, and propose alternative solutions. Given the social and cultural contexts within which the need for clean water access arises, this course encourages students to think holistically about sustainable solutions rather than narrowly about the technical fix. (Prerequisites: This class is restricted to students with 1st or 2nd year standing.) **Lecture 3, Credits 3 (Fall)**

College of Liberal Arts

ITDL-350H

Honors Seminar: Urgent Moral Issues

From artificial intelligence to gender and racial equity to international sanctions, the decisions we make and the actions we take are suffused with ethical dimensions. This seminar involves lively discussion and careful analysis of contemporary issues. Particular topics will change from one semester to the next, but each version of this course will apply ethical frameworks to conceiving, discussing, and striving toward the resolution of nuanced problems. (This course is restricted to students in the Honors program or students with at least a 3.3 cumulative GPA.) **Seminar 1, Credits 1 (Fall, Spring)**

ITDL-415

Storycraft Workshop

This is an intensive, hands-on workshop introducing students to a specialized technology or mode of storytelling (ASL poetry, photojournalism, graphic narratives, digital literature, XR storytelling, memoir, etc.), and or context for storytelling (health care, science communication, engineering, translation studies, K-12 education, corporate leadership, etc.). Students will learn about a particular genre, technology, or context for storytelling, exploring its creative potential and social, cultural, and artistic meaning and potential applications through hands-on work with an expert instructor. It provides an opportunity for students to study emerging or influential modes of story – fictional and nonfictional – and methods of storytelling such as memoir, photojournalism, scientific communication, VR storytelling, among potential workshop foci. Through collaborative activities, students will put their newly acquired story skills to practice with a small group of peers and with instructor guidance and feedback. The workshop is designed for students interested in exploring these areas at every stage, from those interested in a focused introduction, to those interested in adding work to their professional portfolio. **Lec/Lab 3, Credits 1 - 3 (Fall, Spring)**

ITDL-450H

Honors Seminar: Global Engagements

We live in a connected world and our worldviews affect us at multiple scales, from individual standards of morality to law and economics to interactions among nations. Students in this seminar will use interdisciplinary knowledge to engage with complex global issues and events from multiple viewpoints. The particular topics may change from one semester to the next, but each offering will examine some aspect of human thought, behavior, or culture that varies across the globe, whether at individual, cultural, or national scale. Students will be expected to participate in lively discussions, and through mentored contrast and comparison, broaden their understanding of who we are, and who we can be. (This course is restricted to students in the Honors program or students with at least a 3.3 cumulative GPA.) **Seminar 1, Credits 1 (Fall, Spring)**

ITDL-488

Timely Topics

This course will provide a mechanism for teaching topics within the field of humanities and/or social sciences on an ad-hoc basis. This course will serve as a shell to allow the College of Liberal Arts flexibility to allow faculty across the college to teach a short-term course in their area of expertise. These short-term courses can take the form of • a course surrounding a professional opportunity, such as a conference or field study; • a short-term course developed to teach students skills not ordinarily offered in the curriculum, which may lead to a skills-based certification • a pop-up course developed to address a current event. Faculty who wish to stand up this course must have the permission of the department chair as well as the dean's office. **Lec/Lab 1, Credits 1 - 3 (Annual)**

ITDL-498

Liberal Arts Co-op Part Time

Co-op in a field related to Liberal Arts (at least 80 hours). Students will apply the accumulated knowledge, theory, and methods of the discipline to problem solving outside of the classroom. **CO OP, Credits 0 (Fall, Spring, Summer)**

ITDL-599

Interdisciplinary Independent Study

A program of study executed by an individual student with assistance and guidance by an instructor, outside a classroom setting. Guidelines for designing and gaining approval for an independent study are provided in College of Liberal Arts Policy I.D. **Ind Study, Credits 1 - 9 (Fall, Spring, Summer)**

International and Global Studies

INGS-101

Global Studies

Within the past three decades, planetary computerization, burgeoning media industries, and other global processes have significantly altered the ways in which we experience our local and global worlds. Global reconfigurations of time and space change our consciousness, sense of self and others, and the material realities in which we live and work. This course provides the conceptual tools to assess emerging global processes, interactions and flows of people, ideas and things that challenge historical patterns of international studies and relations. The course will introduce you to international and global processes in areas such as global cultural economies, global cities, new forms of democracy and civil society, global religions, sexualities, health, and environments, increased competition for resources, political conflict, war and terrorism. Beyond understanding the causes and consequences of global change, this course will introduce you to ethical dilemmas in global justice movements, and in transferring ideas and technologies in new global contexts. **Lecture 3, Credits 3 (Fall)**

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INGS-201

Histories of Globalization

Globalization is a human process, influenced by contemporary and historical issues that are routinely conceived of as affecting or pertaining to the world's population in its entirety, such as human rights, humanitarianism, environmental degradation, trade, and military power. We use the world and its population as the unit of analysis with an emphasis is placed on issues that appear to be in tension with the role of the nation-state and nationality, and highlight world and global citizenship. We explore critiques of the conceptualization of globality and worldliness as a factor in determining social, cultural, and historical change. **Lecture 3, Credits 3 (Biannual)**

INGS-210

Culture and Politics in Urban Africa

With a focus on African societies, we examine the diverse cultures of African peoples in the context of political and economic forces that have shaped their lives in the past and the present. Topics include European colonialism and its modern-day legacies, ethnic inequalities, economic vulnerability, labor migration, urbanism, and social unrest. We look at how art, music, oral traditions, and literatures have engaged critically with the forces of political change and neo-colonialism. We consider political activism, religious diversity, changing experiences and expectations of women and men, rebellion and revolution, impacts of and creative responses to globalization, and cultural transformations of African diasporas in the U.S and elsewhere. **Lecture 3, Credits 3**

INGS-270

Cuisine, Culture and Power

Physically, culturally, and socially, humans live through food and drink. Spanning the globe, as nearly limitless omnivores, humans have developed myriad ways of collecting and cultivating food and taking advantage of local environments. We also put food to work for us socially by creating cuisine. Through cuisine, we forge and nourish relationships, commune with deities, and through luxury choices, demonstrate our "taste" and lay claim to elite status. Through the cultural practices of production and consumption of food and drink, we wield power. Food and drink consumption patterns have sustained slavery, poverty, malnutrition, and illegal immigration, and have laid waste to the environment. In this class, we explore physical, cultural, social, political, and economic dimensions of food and become more aware of how the private, intimate act of a bite connects us to the rest of humanity. **Lecture 3, Credits 3 (Fall)**

INGS-310

Global Slavery and Human Trafficking

This course examines historical and contemporary dimensions of global slavery and human trafficking. The trans-Atlantic slave trade was the world's largest forced migration between continents, but it was only one of many slave trades that shaped societies throughout the world. In order to understand the historical significance of global slave trades, we will compare it to other systems of slavery. In examining the historical significance and legacies of the slave trade, we will link different regional histories to the growth of market-based capitalist economies into the 20th century. The course will also examine the changing meaning of the term 'slavery' and examine some modern forms of forced labor, bondage, and slavery that persist in this day in all sectors of the global economy. We will explore the rise of human trafficking, and global anti-trafficking programs and campaigns. **Lecture 3, Credits 3 (Fall or Spring)**

INGS-455

Economics of Native America

This course will analyze current and historic economic issues faced by Native Americans. It will also examine government policies enacted by and directed toward Native Americans with a focus on their economic implications. This will be done using standard economic models of the labor market, poverty, trade, development, and gaming. **Lecture 3, Credits 3 (Spring)**

INGS-489

Topics in Global Studies

This course focuses on specific themes or issues in global studies, chosen by the instructor, vetted by the department chair, announced in the course subtitle on SIS, and developed in the syllabus. The topics of this course will vary, but the course number will remain the same. Students may repeat the course for credit, but may not repeat the same topic. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

INGS-499

Co-op

Paid work experience in a field related to international and global studies (at least 160 hours of work, completed over at least four weeks). Students will apply the accumulated knowledge, theory, and methods of the discipline to problem solving outside of the classroom. (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Fall, Spring, Summer)**

INGS-501

Capstone Seminar

This upper division seminar constitutes the final core requirement in the international and global studies degree program. Students will enroll in this course in their final year of study. The capstone seminar will further develop and sharpen the student's understanding of globalization and international processes. The course uses a problem-solving focus to provide a detailed analysis of one or more contemporary issues in the field of international and global studies, culminating in a written senior thesis and project presentation. (Prerequisites: INGS-101 or equivalent course and 4th year status.) **Research, Credits 3 (Fall, Spring, Summer)**

ING5-502**Advanced Research**

Seminar for majors in international and global studies. Upon successful completion of the capstone seminar, qualified students may engage in enhanced research in a specific area or dimension of their capstone project under the supervision of a faculty expert. May be taken either as an elective in the advanced study option in international and global studies or as an institute elective. Under the supervision of and collaboration with a faculty expert, the students will further explore, investigate, and rewrite an aspect of their senior project for a conference presentation, for publication, or for enhancement of expertise in their selected field specialization. (Prerequisites: INGS-501 or equivalent course.) **Research, Credits 1 - 6 (Fall, Spring, Summer)**

ING5-597**Study Abroad**

Students will develop skills in critical thinking, ethical reasoning, problem-solving, and communication in an international setting through participating in a Study Abroad program (at least four weeks). **CO OP, Credits 0 (Fall, Spring, Summer)**

ING5-598**Internship**

Internship in a field related to international and global studies (at least 160 hours of work, completed over at least four weeks). Students will apply the accumulated knowledge, theory, and methods of the discipline to problem solving outside of the classroom. (Enrollment in this course requires permission from the department offering the course.) **Internship, Credits 0 - 16 (Fall, Spring, Summer)**

ING5-599**International and Global Studies Independent Study**

The student explores in depth a topic of choice, under supervision of a faculty member. The student will typically meet weekly with the instructor to discuss the readings and will write paper(s) that synthesize and critique them, or the student may work with the faculty member on original research. **Ind Study, Credits 1 - 12 (Fall, Spring, Summer)**

Museum Studies

MUSE-220**Introduction to Museums and Collecting**

This course examines the history, theory, ideology, and practice of collecting within the institutional context of the museum. It considers the formation of the modern museum, and focusing on the American context, investigates the function and varieties of museums, ranging from natural history, anthropology, science and technology, history, and art. The course explores the history of the museum and its evolution institutionally, ideologically, and experientially. The course also considers the operations of museums from accessioning through deaccessioning, examining museum management, collections management and collections care. The course also explores museum governance and the professional ethics and legal constraints that affect museum professionals. The course examines how a museum carries out its mission of public education through its collections and exhibitions, as well as through its educational programs and community outreach and visitor studies. Current issues in the museum world are also considered, including: the museum's educational function versus its entertainment function; the problems of staying solvent in an era of diminishing governmental and corporate subsidies; deaccessioning collections to support the museum operations; issues of art theft and repatriation (ranging from colonial era and Nazi era plunder, the disposition of human remains and sacred objects, and illicit trafficking); the evolving responsibilities of the museum to its public and the cultural heritage; and the rise of the virtual museum. Throughout the semester, the course examines museums and their practices through the perspectives of colonialism, nationalism, class, race, age, gender, and ethnicity. The course includes field trips to local museums and collections throughout the semester. **Lecture 3, Credits 3 (Fall)**

MUSE-221**Introduction to Public History**

Public history is using the research-based methods and techniques of historians to conduct historical work in the public sphere. If you've gone to a museum, conducted an oral history, researched your old house, or learned from an interpreter at a park or historic site, you've seen public history in action. This course will introduce students to the wide variety of careers in public history, and will examine the challenges and opportunities that come with doing history in, with, and for the public. **Lecture 3, Credits 3 (Spring)**

MUSE-223**Historic Photographic Processes**

This is a studio based class in which student recreate a number of different nineteenth century photographic processes. Students will explore the history of photographic technology through use of primary sources and hands on projects. The chemistry and deterioration of the materials will be reviewed through the use of primary texts, projects, and discussion. **Lecture 3, Credits 3 (Spring)**

MUSE-224**History and Theory of Exhibitions**

Art exhibitions are organized around a curatorial premise, a statement that articulates an idea allowing for the selection of work included in an exhibition. This course begins with an overview of exhibition history, starting with the transformation of the Louvre into the first public art museum following the French Revolution, where art history, a discipline developed in the 19th century, was enlisted to organize exhibition. The course then examines the proliferation of types of exhibitions that accompanies modernism, up to the present, paying close attention to the curatorial premise animating the exhibitions. **Lecture 3, Credits 3 (Spring)**

MUSE-225**Museums and the Digital Age**

The digital revolution has profoundly influenced how we think about the world around us. Information once available only to experts is now accessible digitally to a much broader audience. Museums, archives, and libraries have adapted to this democratization of knowledge and decentralization of access in myriad ways. As visitors to museums—whether online or onsite—each of us is part of the creation, consumption, and reception of digital information. What does this mean for museums and for us as audiences and consumers of such information? How has the combination of digital technology and social media increased visitors' abilities for interaction with cultural institutions, their collections, and other visitors? This course will examine the history and evolution of museum practices as they adapt to new technologies and rethink traditional museum practices. The course has no pre-requisite and is open to students of all majors. **Lecture 3, Credits 3 (Fall)**

MUSE-226**Introduction to Cultural Heritage**

Cultural heritage is a fluid term that applies broadly to the creation, protection, and preservation of material objects and intangible practices for future generations. This course examines the concepts associated with cultural heritage and the way the term has evolved over time to encompass many forms of practice. With a global outlook, the course explores the various forms that cultural heritage takes and considers the issues that are raised. Course content may be site-specific. **Lecture 3, Credits 3 (Spring)**

MUSE-241**Topics in Museum Studies: Art, Design, and Exhibition Projects**

This variable topic course examines one or more methods, concepts, or theories of museum studies and its intersection with art, craft, and design. Whether focusing on the content of collections (i.e., fine art, craft, design, or other disciplines) or the conceptual development of displays informed by a curatorial premise informed by methods, concepts, and theories of museum studies, the course frames art and design collections in relation to exhibition projects. The course centers themes, figures, movements, or issues associated with artistic practice, and/or the historical, cultural, and theoretical questions of exhibitions and display. The topic for the course is chosen by the instructor, announced in the course subtitle, and developed in the syllabus, particularly through the readings and deliverables. The course can be taken multiple times provided that the topic is different. The artistic framing for these topics may center one or both of the following areas of inquiry: art, craft, and design as the subject of the course (i.e., focusing on the collections held by RIT at the Dyer Arts Center, Cary Graphic Art Collection, and Vignelli Center for Design Studies) and/or creative approaches to deliverables, from ideation to presentation in one of the gallery spaces at RIT, or in another exhibition space (including online). **Lecture 3, Credits 3 (Fall, Spring)**

MUSE-244**Topics in Museum Studies: Museums and Society**

This variable topic course examines one or more methods, concepts, or theories of museum studies as a framing for understanding of the diversity of human cultures today and over time. Whether focusing on the content of collections (i.e., cultural heritage, undocumented migration, wrongful imprisonment, de-colonization) or the conceptual development of displays informed by a curatorial premise informed by methods, concepts, and theories of museum studies, the course examines topics of social relevance in relation to exhibition projects. The course centers themes, figures, movements, or issues of contemporary society, and/or the historical, cultural, and theoretical questions of exhibitions and display. The topic for the course is chosen by the instructor, announced in the course subtitle, and developed in the syllabus, particularly through the readings and deliverables. The course can be taken multiple times provided that the topic is different. **Lecture 3, Credits 3 (Spring)**

MUSE-249**Topics in Archives, Museums, and Community Collections**

Topics courses offer the opportunity to build knowledge specific to events, issues, and opportunities unique to archives, museums, and collecting institutions. Topics and methods vary from term to term, though each offering features an introduction to a concept, methodology, institution, or other subfield of study within museum studies or public history. Students develop theoretical and experiential knowledge of the topic under investigation while fostering opportunities to respond to recent events or to partner with local organizations and institutions. Students also create deliverables appropriate to the experience. The topic will be announced prior to the course offering. The course may be repeated for credit since topics will normally vary from semester to semester. **Lecture, Credits 1 - 3 (Fall or Spring)**

MUSE-340

Introduction to Archival Studies

This course introduces students to the role of archives in the construction of a society's cultural heritage and historical identity. Archives are repositories of a culture's original documents, both paper and electronic, and they function as a site for the construction, preservation, and dissemination of historical memory, as a source for social responsibility, and as a tool for the understanding of the cultural, social, and political forces that influence events. The course will examine the history of archives, the theory and practice that guide the work of archivists, and examine the basic components of an archival program: including acquisition and appraisal, arrangement and description, preservation and legal and ethical issues related to access to archival records. The class will also cover the transformation of the profession in the digital age, including digital preservation, the work of archival appraisal and collection building in an age of digital proliferation, and archival collection management systems. **Lecture 3, Credits 3 (Fall)**

MUSE-341

Museum Education and Interpretation

This course introduces students to the educational mission of the museum and to the museum's role in educating citizens for participation in a democratic, pluralistic society. As sites of informal learning, museums have an educational impact on our lives beyond our formal schooling. The course focuses on a wide range of educational activities within museums that address visitors of all ages as individuals and as members of a democratic society, and helps to foster in them a sense of community, civic responsibility, tolerance for multiple viewpoints, and lifelong love of learning. The course examines the institutional shift from a fixed, scholarly approach to exhibiting collections to one that embraces the concept of interpretation, where visitors are encouraged to engage in a variety of experiences, make their own connections with objects and other visitors, and ultimately construct their own meanings. **Lecture 3, Credits 3 (Fall)**

MUSE-354

Exhibition Design

This course examines the history and practice of exhibition design. It reviews the history of exhibitions within the development of museum-like institutions. In this course the following aspects of exhibition design are considered: curatorial premise or theme, exhibition development timeline, exhibition site, contracts and contractual obligations, budgets and fundraising, publicity material, didactic material, and exhibition design. The course includes field trips to local institutions and collections throughout the term. **Lecture 3, Credits 3 (Fall)**

MUSE-355

Fundraising, Grant Writing, and Marketing for Nonprofit Institutions

This course examines the growing autonomy of collecting institutions as they are cut off from various forms of governmental sponsorship and public subsidy and their subsequent needs for raising money from outside, non-traditional sources. The course looks at issues of needs assessment, budgeting, and strategic planning. It focuses on the design and implementation of effective fundraising campaigns, as well as on the organization and writing of successful grant proposals. It also considers the importance of marketing to overall institutional success. **Lecture 3, Credits 3 (Fall)**

MUSE-357

Collections Management and Museum Administration

This course presents an overview of the administration and management of museums and their collections. The course examines the governance structure of museums, focusing on personnel responsible for their administration, curation and education, and operations, as well as on the mission statement and policies they determine. The course also details the management of collections, including the development of a collections policy, management of that policy, documentation and record keeping, acquisitions, and the creation/management of exhibitions. Finally, the course considers collections care or preventive conservation, looking at both the facility and collections. Throughout the term, legal and ethical issues pertaining to museums and their collections will be emphasized. (Prerequisites: MUSE-220 or 0533-421 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MUSE-358

Legal and Ethical Issues for Collecting Institutions

This course presents an overview of the legal and ethical issues that govern the institutions and personnel involved in collecting cultural resources. Collecting institutions are governed by national, state, and local laws that define how facilities and collections are used and this course will consider them, as well as the larger social and historical context out of which they developed. The course will consider the evolution of the museum as a public institution and how the legal system increasingly defined minimum standards for maintaining collections, the facilities in which they are housed, and guaranteeing public access; in addition legal standards for the collection will be studied, including definitions of ownership, what this means in terms of intellectual property rights, copyright, reproduction (traditional and electronic), and deaccessioning/disposal. These will be studied within the context of the society within which the institution functions. The course will also study the development of national and international ethical standards and will examine the codes of behavior that govern the personal and professional conduct of museum professionals and the practices that comprise conflicts of interest. Ethical standards for collecting institutions will also be considered, particularly those that address the responsibilities to a collection, the ethics of acquisition, the question of illicit or stolen material, the issues of human remains and objects of sacred significance, and repatriation. Attention will be paid to the changes in society that made these issues critical for collecting institutions. **Lecture 3, Credits 3 (Spring)**

MUSE-359

Cultural Informatics

This course introduces students to Cultural Informatics, the interdisciplinary field that examines the intersections of information technologies, information science, and cultural information centered in museums, libraries, and archives. Among the topics to be examined are: how information technologies are used in museums, libraries, and archives; how modern information systems have shaped the museum environment; the nature of convergence; the development of digital collections, digital curation, and online exhibitions; and the role and status of the information professional in the museum and cultural organizations. The course is designed around projects, case studies, and readings so that students gain hands-on experience working with information. The course has no prerequisite and is open to students of all majors. **Lecture 3, Credits 3 (Fall)**

MUSE-360

Visitor Engagement and Museum Technologies

All of us, as museum visitors, have the capacity to engage with collections and to create meanings as a result of such interaction. This course considers the history and theory of visitor engagement at museums, galleries, and sites of cultural heritage tourism; examines the import of technology into this history; and articulates the role of visitors as participants who curate their own experiences. Two key questions will be addressed in this course: 1) How does technology provide a platform for contribution, collaboration, co-creation, and co-opting of experiences among all visitors? and 2) Can technology mediate the best possible experience for visitors? The course has no prerequisite and is open to students of all majors. **Lecture 3, Credits 3 (Spring)**

MUSE-361

Tablet to Tablet: A History of Books

From ancient clay and wax tablets, to scrolls and medieval manuscripts, to printed books and iPads, this class examines the history of books from 2300 BCE to the present. Students study books not only as vehicles for texts, but also as physical artifacts that carry with them important evidence of the cultures that produced and read them. Using the Cary Graphic Arts Collection as their research laboratory, students investigate the evolution of books through hands-on interaction with artifacts both ancient and modern, while also pondering what forms future books might take. **Lecture 3, Credits 3 (Spring)**

MUSE-388

Gender and Contemporary Art

This course traces the historical development of women's activism in the art world from the 1970s to the present. We will interpret how this art activism, which artists and scholars alike have referred to as the feminist art movement, has examined how gender informs the ways art is made, viewed, conceptualized in history and theory, and exhibited in museums and visual culture, in a range of cultural contexts. We will also analyze how current artists, critics, and curators continue to build on this history, in particular how they use the concept of gender intersectionally to develop a variety of new creative practices, theories, modes of exhibition and social engagement. **Lecture 3, Credits 3 (Spring)**

MUSE-449

Special Topics Museum Studies

A focused, in-depth critical examination and analysis of a selected topic in Museum Studies, varying according to faculty teaching the course. **Lecture 3, Credits 3 (Spring)**

MUSE-489

Research Methods

This class introduces students to the methods of research appropriate for scholarship in the field of Museum Studies. Students will learn how to locate, analyze, assess, critique and conduct research in the field. They will choose the topic of their senior thesis project, develop a clear statement of how that topic will be explored, and construct an annotated bibliography relevant to that topic. This course leads to the development of a proposal for a senior thesis project that is suitable for full implementation in Senior Thesis for museum studies. (This class is restricted to students with at least 3rd year standing in MUSEUM-BS.) **Research 3, Credits 3 (Fall, Spring)**

MUSE-490

Senior Thesis in Museum Studies

The Senior Thesis in Museum Studies is the final requirement in the degree program. Students will conduct the appropriate research to address the topic they had proposed in Research Methods. They will present their results as a formal written thesis and in an appropriate public forum. The course provides students the opportunity to develop their research and practical skills and to share the results with the department and the college. (Prerequisites: MUSE-489 or equivalent course.) **Research 3, Credits 3 (Fall, Spring)**

MUSE-491

Senior Thesis I

The Senior Thesis in museum studies I is the first course in the final sequence required for completion of the degree program. In this section, students will work with their thesis advisors to define their senior thesis project, engage in preliminary research, write an abstract containing the thesis statement/research question, construct their formal thesis proposal, and develop a plan of work for Senior Thesis in Museum Studies II. (Enrollment in this course requires permission from the department offering the course.) **Seminar, Credits 1 (Spring)**

MUSE-492**Senior Thesis II**

The Senior Thesis in Museum Studies II is the second course in the final sequence required for completion of the degree program. In this section, under the guidance of their thesis advisors, students will to their research and write their literature review. They will also revise their content outline based on this research. Finally, they will develop a new plan of work for the completion of their thesis in Senior Thesis in Museum Studies III. (Prerequisites: MUSE-491 or equivalent course.) **Lecture 2, Credits 2 (Fall)**

MUSE-497**Museum Studies Internship**

Internship in a field related to Museum Studies (at least 50 hours). Students will apply the accumulated knowledge, theory, and methods of the discipline to problem solving outside of the classroom. (MUSEUM-BS) **Internship, Credits 0 (Fall, Spring, Summer)**

MUSE-498**Museum Studies Co-Op Part Time**

Co-op in a field related to museum studies (at least 80 hours). Students will apply the accumulated knowledge, theory, and methods of the discipline to problem solving outside of the classroom. (MUSEUM-BS) **CO OP, Credits 0 (Fa/sp/su)**

MUSE-499**Museum Studies Co-op**

Co-op in a field related to museum studies (at least 200 hours). Students will apply the accumulated knowledge, theory, and methods of the discipline to problem solving outside of the classroom. **CO OP, Credits 0 (Fall, Spring, Summer)**

MUSE-599**Independent Study**

A program of study executed by an individual student with assistance and guidance by an instructor, outside a classroom setting. Guidelines for designing and gaining approval for an independent study are provided in College of Liberal Arts Policy I.D. **Ind Study, Credits 1-12 (Fall, Spring, Summer)**

Performing Arts

PRFL-130**Introduction to Theatre**

An introduction to theatre as a performing art. Students develop skills in reading, analysis and evaluation through an examination of theatre's forms, constituent elements, and its cultural, stylistic and historical development. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

PRFL-220**Theatre Ensemble**

The Theatre Ensemble is an experiential-learning course in which students will have various opportunities to apply theoretic knowledge to practice through participation in a faculty mentored or faculty directed theatre production on campus. Course content will include CLA main stage productions, as well as other ensemble productions that perform or develop theatre performances covering a range of genres, periods and cultures. Students will be expected to write, create and/or analyze texts as well as participate as actors, designers, and technicians. **Studio 1, Credits 1 (Fall, Spring)**

PRFL-221**Fundamentals of Acting**

This course will introduce students to the history and theory of acting in Western Culture from the late 19th century up to the present day. Particular focus will be paid to the theories of Stanislavsky and Stanislavsky-based approaches along with complementary and contrasting methods developed by such theorist/practitioners as Jerzy Grotowski, Lee Strasberg, and Sanford Meisner. Students can expect a course that combines lecture/discussion with practical exercises designed to apply concepts and theory using acting techniques designed to strengthen vocal and physical expression and to stimulate the imagination. In addition, actors will be introduced to scene work and develop skills for text analysis as a basis for character development. Assessment will include quizzes, papers, and in-class participation in exercises and scene work. As an introductory course, the course objectives are to provide students with a broad survey of the aesthetics, theory, and practice of acting. **Lecture 3, Credits 3 (Spring)**

PRFL-227**Dramatic Theory and Text Analysis**

The course is designed to provide students with a foundation in major dramatic and performance theories including works by Aristotle, Stanislavsky, Brecht, Grotowski, and a variety of other contemporary theorists and practitioners. In addition to surveying the work of key dramatic and performance theorists and theories, the course will engage students in the application of these theories in the study and analysis of play texts from a variety of periods, genres and cultures. Students will analyze these texts from the perspective of both the logistic and aesthetic requirements of production (as actors, directors and designers). **Lecture 3, Credits 3 (Fall)**

PRFL-230**Devising Theatre: Creating Ensemble Based Performance**

Devising theatre is a collaborative process in which a group of individuals produce a wholly new or adapted piece of theatre. This course is a hands-on exploration of that collaborative process and places students at the center of their own artistic expression. Through a series of class discussions and lectures, readings, writing assignments, creative exercises, brainstorming sessions, and acting workshops, students will learn about the history and theories of devised theatre as a tool for social change, while also generating their own theatrical pieces for individual and group presentation. Above all, this course fosters an ensemble-building atmosphere and imparts to students the importance of teamwork and communication in working toward a shared goal. **Lecture 3, Credits 3 (Fall)**

PRFL-239**Design/Stagecraft Apprenticeship**

This course is designed to provide motivated students interested in technical theatre the opportunity to observe and participate in the theatre design process from conception to execution, while learning basic stagecraft skills involved in professional theatre production via an internship at a local theatre. Students will work directly with professional directors, designers and stage technicians on the production of a play from design concept to performance. The experience will allow active engagement in collaborative processes and methods commonly employed to create theatre productions. Depending upon the interests and abilities of the student, and the needs of the specific production, students may be assigned to a specific area of design stagecraft (i.e. Costumes or Scenic), or learn and engage in a more general capacity. The learning objectives of this apprenticeship are to give students an understanding of the goals and methods of design and stagecraft as critical elements in translating a play text into a fully realized artistically unified theatre expression. Students will have bi-weekly meetings with the instructor. (This course requires permission of the Instructor to enroll.) **Studio 3, Credits 1 (Fall, Spring)**

PRFL-250**Music History 1: Antiquity to Bach**

This course explores the creation, performance, and reception of music within the context of Western cultural, religious, political and artistic ideals, and related non-Western traditions, from Greek antiquity to ca. 1750. Topics of exploration include the development of musical notation, musical instrument technology, the interrelationships of music theorists, composers, performers, patrons, and audiences, music as a communicative and expressive art, aesthetics, and musical analysis and criticism. **Lecture 3, Credits 3 (Fall)**

PRFL-251**Music History 2: Haydn to Stravinsky**

This course explores the creation, performance, and reception of music within the context of Western cultural, religious, political and artistic ideals, and related non-Western and popular traditions, from ca. 1750 to ca. 1920. Topics of exploration include musical instrument technology, the interrelationships of music theorists, composers, performers, patrons, and audiences, nationalism, the influence of folk and non-Western music traditions on Western art music, popular music traditions, music as a communicative and expressive art, philosophy and aesthetics of the Enlightenment and 19th century, and musical analysis and criticism. (Prerequisites: PRFL-160 or PRFL-250 or PRFL-265 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

PRFL-321**Traditions of Theatre in Europe**

A survey of theatre and drama of selected European nations and periods, emphasizing plays and theatre productions in particular historical, artistic, and theoretical contexts (e.g. "Modernist European Theatre and Drama, 1890-1930" – "Romanticism and Realism on Continental Stages"; "France and Germany, 1789-1989"; "Theatre of the European Renaissance"; "Major Dramatists of Scandinavia, Russia, and Central Europe"). **Lecture 3, Credits 3 (Fall)**

PRFL-322**Traditions of Theatre in the U.S.**

A historical survey of American theatre and drama, from the Colonial period to the early 21st century, focusing on a selection of significant plays and stylistic movements in the twentieth century. Plays studied include those by Eugene O'Neill, Arthur Miller, Tennessee Williams, Edward Albee, Sam Shepard, and Tony Kushner, along with alternating selections by less well-known and/or marginalized American dramatists, 1925 to 2000. The varied types of drama, styles and modes of theatre production, and contributions of actors, directors, scenographers, theorists, and critics provide a continuous context for this study of America's developing theatre arts. **Lecture 3, Credits 3 (Spring)**

PRFL-323**Traditions of Shakespearean Theatre**

A course in Shakespeare's drama that emphasizes the plays as potential theatre productions. Studying a selection of plays representative of the different acknowledged types of Shakespearean drama (comedy, tragedy, history, problem comedy, romance), students gain a broad understanding of the character and range of Shakespeare's poetic-dramatic art. Experimenting with production activities such as oral interpretation, character presentation, and scene rendering, they acquire a practical appreciation of Shakespearean drama's theatrical potency, of the original staging conventions, and of how each type of play makes particular generic demands on both performer and spectator. Augmenting the reading and expressive activities is a term research project focused on collaborative realization of a staging interpretation of selected scenes from the Shakespeare plays on the syllabus. **Lecture 3, Credits 3 (Fall)**

PRFL-324 African American Playwrights

A historical survey of African American playwrights and the significant moments, topics, and themes that informed their work from the late 1800's to the early 21st century. Plays by American African Diaspora playwrights will be studied and will include works by Ira Aldridge, Langston Hughes, Lorraine Hansberry, Amiri Baraka, Lynn Nottage, August Wilson, George C. Wolfe, Ed Bullins, Anna Deavere Smith, and Ntozake Shange. The varied types of drama, styles and modes of theatre production, and contributions of actors, directors, scenographers, theorists, musicians, and critics provide a continuous context for this study of America's developing theatre arts. **Lecture 3, Credits 3 (Spring)**

PRFL-327 American Musical Theater

This course is a survey of the development of the American Musical Theater, highlighting representative works, composers, librettists and performers of both the cultivated and vernacular traditions. It is further designed as an appreciation course, fostering the development of a greater appreciation for all types of stage music and the ability to better evaluate the quality of a work, the performance, and the performers. **Lecture 3, Credits 3 (Spring)**

PRFL-330 Performing Identity in Popular Media

This class is a critical, theoretical, and practical examination of the constitution and performance of personal identity within popular media as it relates to identity politics in everyday life. Through lectures, readings, film, and critical writing, students will examine elements of personal identity and diversity in popular media in order to foster a deeper understanding of how identity is constructed and performed in society. **Lecture 3, Credits 3 (Spring)**

PRFL-331 Fundamentals of Directing

This course examines the director's creative process in translating a dramatic text into a theatre production. Key to this process is the need to develop deep capability in text analysis and interpretation, along with strong skills to meet the challenges brought on by the practical needs of production. Combining lecture and discussion with text analysis assignments and in-class exercises, students will learn how to approach the creation of a director's production concept for a text, and then explore, through rehearsals and staging, the process of bringing a dramatic story to life on stage in an engaging and compelling manner. Particular emphasis will be placed on how to synthesize different elements with one another to create a coherent expression designed to elicit intellectual, emotional, and critical responses from audiences. Course will culminate with each student presenting a scene or short on-act play fully staged for peer and instructor feedback. Leadership, collaboration, presentation skills, creative problem-solving, and project management will be taught as crucial elements of the process. **Lecture 3, Credits 3 (Spring)**

PRFL-332 Fundamentals of Stage Management

This course investigates the history, theories, and techniques of the theatrical stage manager in order to give a historical and practical understanding of its roles and responsibilities. Emphasis will be placed on the stage manager's role in the collaborative process. Using readings, lectures, discussions, and practical exercises, students will learn the history, responsibilities, and procedures of stage management from pre- to post-production. **Lecture 3, Credits 3 (Spring)**

PRFL-333 Auditioning Techniques

This course will run parallel to PRFL 221: Fundamentals of Acting by introducing and developing acting concepts and techniques that focus on the audition process. Through a variety of audition settings such as theatre, musical theatre, television, and film, students will hone their skills of play reading, script analysis, character development and personalization, memorization, improvisation, and confidence in presenting their work. Students can expect a course that is highly experiential. At the end of the semester students will have created an audition repertoire book to take into any audition setting. The skills built in this course can be applied to job interviews in most other careers and disciplines. **Studio 3, Credits 3 (Fall)**

PRFL-334 Scene Study

This course will continue to develop concepts introduced in PRFL 221: Fundamentals of Acting and PRFL 333: Auditioning Techniques and will focus on scene study. Through scenes from a variety of play texts such as contemporary, American classic, European Realism, Shakespearean, as well as tv/film scripts, students will hone their skills of text reading, script analysis, character development and personalization, memorization, collaboration, teamwork, improvisation, and confidence in presenting their work. Students can expect a course that is highly experiential. By the end of the semester, students will have gained experience and understanding of the acting styles and conventions related to several major theatrical periods. (Prerequisites: PRFL-221 or PRFL-333 or equivalent course.) **Studio 3, Credits 3 (Spring)**

PRFL-352 Russian Music and National Identity

Russia's history contains a complex blend of indigenous artistic expression and artistic influences from beyond its borders. Given its large land mass and geographical position spanning Europe and Asia, Russian monarchs struggled with understanding who the Russian people were, but also how to best navigate the cultural and economic commonalities and differences among their neighbors, with whom they desired relationships. This course explores the many ways music in Russia reflected the cultural influences apropos to its complex history and national identity in the world. The focus will be on the political, social, and artistic aspects of Russian music nationalism emerging in the 19th century and continuing into the 20th-century Soviet Era, but will include a review of the cultural and historical background from the 9th through the 18th centuries which led to Russia's own, unique musical and artistic language. This is a writing-intensive seminar-format course, encouraging students to develop their research and writing skills, and their abilities to analyze, argue and persuade within historic, cultural, artistic, and aesthetic fields. **Seminar 3, Credits 3 (Fall, Spring)**

PRFL-489 Special Topics

Allows examination of a special problem or topic area in the theatre, dance, music, visual arts, and other performing and fine arts. Topics and specific content and methods vary from term to term. Each term's offering, however, features an introduction to a historical period, movement, phenomenon, practitioner(s), or other subfield of study within performing arts and/or visual culture. In so doing, students develop theoretical and experiential knowledge of an artistic period, movement, phenomenon, practitioner(s) or other subfield of study within performing arts and/or visual culture. **Lecture 3, Credits 3 (Fall, Spring)**

PRFL-490 Special Topics in Performing Arts

An in-depth examination of a selected aspect of performing arts with a focus on performance and composition. **Lecture, Credits 1 - 3 (Fall, Spring)**

Philosophy

PHIL-101 Introduction to Philosophy

Philosophy is about the rigorous discussion of big questions, and sometimes small precise questions, that do not have obvious answers. This class is an introduction to philosophical thinking where we learn how to think and talk critically about some of these challenging questions. Such as: Is there a single truth or is truth relative to different people and perspectives? Do we have free will and, if so, how? Do we ever really know anything? What gives life meaning? Is morality objective or subjective, discovered or created? We'll use historical and contemporary sources to clarify questions like these, to understand the stakes, to discuss possible responses, and to arrive at a more coherent, more philosophically informed, set of answers. **Lecture 3, Credits 3 (Fall, Spring)**

PHIL-102 Introduction to Moral Issues

This course examines ethical questions that arise in the course of day-to-day individual and social life. Some consideration will be given to ethical theory and its application to such questions, but emphasis will be on basic moral questions and practical issues. Examples of typical issues to be examined are: What are the grounds for moral obligations like keeping promises or obeying the law? How do we reason about what to do? Examples of typical moral issues that may be introduced are capital punishment, euthanasia, abortion, corporate responsibility, the treatment of animals, and so forth. **Lecture 3, Credits 3 (Fall, Spring)**

PHIL-103 Critical Thinking

The purpose of this course is to improve everyday reasoning skills. Critical thinking means evaluating the reasons for our actions and beliefs. Ideally, we think our actions are rational, not arbitrary. But one does not have to look far to discover disagreement and apparent irrationality. What accounts for this? This course investigates how to argue effectively, how to evaluate evidence and reasons, and how to marshal good evidence and reasons in order to arrive at reliable knowledge and justified action. It covers common mistakes that people make in causal, statistical, moral, and everyday reasoning, and it teaches how and when it pays to be skeptical, reflective, and critical. **Lecture 3, Credits 3 (Fall, Spring)**

PHIL-201 Ancient Philosophy

This course examines the origin and development of Western philosophy in ancient Greece from Thales in the 6th century down to at least the 4th century B.C.E., concentrating on the central ideas of the pre-Socratics, the Sophists, Socrates, Plato, and Aristotle. Some attention might also be given to the Hellenistic philosophers (Epicureans, Stoics, and Sceptics). This was a period of remarkable intellectual creativity in philosophy, mathematics, medicine, rhetorical theory, ethics, aesthetics and cosmology. Questions to be considered in this course will include: What are the nature and limits of knowledge? Is knowledge even possible? What is the nature of language? How reliable is perception? What is the true nature of reality? What is the origin and nature of the material world? Is moral knowledge possible? What is the nature of happiness, and what sort of life would make people happy? **Lecture 3, Credits 3 (Fall)**

PHIL-202**Foundations of Moral Philosophy**

This course is a survey of foundational, and normative, approaches to moral philosophy and their motivating moral questions. Topics will include virtue ethics, deontology, consequentialism, and other approaches. Some of the questions to be examined are: How is human nature related to morality? What are the grounds for moral obligations? Is there an ultimate moral principle? How do we reason about what to do? Can reason determine how we ought to live? What are moral judgments? Are there universal goods? What constitutes a morally worthwhile life? Can morality itself be challenged? **Lecture 3, Credits 3 (Fall)**

PHIL-203**Modern Philosophy**

This course examines the history of modern philosophy, from Descartes through Kant. It concentrates on the development of modern thought, examining the concepts of mind, body, and causation among others. This period marked the beginning of modern science, with a rich ferment of ideas, and the philosophy of the period is essential to understanding modern science as well as contemporary problems about consciousness, mind/body interaction, causation, and so on. Questions to be considered in this course include the following: What can we know? How do we come to know what we can know? What is the scope and what are the limits of our knowledge? What is the nature of reality? Do we have access to reality? How is causal interaction possible, if at all? Does God exist, and if so, how do we know and what relation does God have to the world? **Lecture 3, Credits 3 (Spring)**

PHIL-205**Symbolic Logic**

An introduction to symbolic, or formal, deductive logic and techniques, such as truth tables, truth trees, and formal derivations. The emphasis will be on propositional (or sentential) logic and first-order predicate logic. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

PHIL-301**Philosophy of Religion**

This course will examine critically definitions, assumptions, and arguments central to religion. Topics may include interpreting the nature of religion, arguments for and against the existence of God, the relation between theology and philosophy, the relation between God and the world, paganism, the problem of evil, and the nature of religious language and experience. **Lecture 3, Credits 3 (Fall)**

PHIL-303**Philosophy of Art/Aesthetics**

This course introduces students to thinking philosophically about the nature of art and its relation to other human experiences. Among the topics considered are the aesthetic experience, the relation between morality and art, ugliness in art and truth in art. **Lecture 3, Credits 3 (Spring)**

PHIL-304**Philosophy of Law**

An introduction to philosophical analysis centering on the nature, extent and justification of law, the nature of legal thought, and the problems and theories of justice and the relationship between law, ethics and morality. **Lecture 3, Credits 3 (Spring)**

PHIL-305**Philosophy of Peace**

An introduction to some of the philosophical dimensions of the search for world peace, including the elements that would constitute a just and lasting peace, nations as moral entities, justice and national self-interest, force and violence, the morality of the use of force, peace-making and peace-keeping groups. **Lecture 3, Credits 3 (Spring)**

PHIL-306**Professional Ethics**

This course critically examines ethical issues that arise in professional life. The course will examine not only the general relationship between ethics and professional life but the particular consequences of ethical considerations within the student's own profession and the professions of others with whom the student must live and work. **Lecture 3, Credits 3 (Fall)**

PHIL-307**Philosophy of Technology**

Technology is a ubiquitous and defining force in our world. This course investigates how our conceptions of technology have emerged within philosophy, as well as the role technology plays in shaping how we live and how we reflect upon questions of meaning and value in life. Technological modes of understanding, organizing and transforming the world shape our relationships with others, with ourselves and with nature at fundamental levels. We will explore how these modes have emerged and why they emerged so predominantly within a Western social and intellectual context. **Lecture 3, Credits 3 (Fall)**

PHIL-308**Environmental Philosophy**

Environmental philosophy examines the ethical, metaphysical, and social justice questions surrounding human interactions with nature and the management of natural resources. This course explores the nature and source of environmental values and how environmental goals are achieved through policy decisions. We evaluate and apply philosophical and ethical theory to environmental issues such as endangered species, climate change, wilderness preservation, sustainability, and environmental justice. **Lecture 3, Credits 3 (Fall)**

PHIL-309**Feminist Theory**

This course examines the main currents in contemporary feminist thought. Feminist theory explores the nature and effects of categories of sex and gender upon our ways of living, thinking and doing, while also challenging how gendered assumptions might shape our conceptions of identity and inquiry more generally. Different conceptions of sex and gender will be discussed, and the course will investigate how these concepts affect our lives in both concrete and symbolic ways. Special attention will be paid to how gendered assumptions color our understanding of knowledge production, experiences of embodiment and emotion, public and private activities, and the nature of ethical decision making. **Lecture 3, Credits 3 (Fall)**

PHIL-310**Theories of Knowledge**

Epistemology, or the theory of knowledge, examines how we come to know what we know. This course covers historical and contemporary approaches to the question of what knowledge is, what makes a belief true, and how beliefs are justified. Philosophical skepticism, the idea that we actually know nothing at all, will also be discussed, as well as possible responses. Other topics may include epistemic relativism, feminist epistemology, naturalism, the internalism/externalism debate, and the application of epistemology to other fields. **Lecture 3, Credits 3 (Spring)**

PHIL-311**East Asian Philosophy**

This course is an introduction to the origin and development of the philosophical traditions of primarily China and Japan through a consideration of selected thinkers, schools, and classic texts of Daoism, Confucianism, Buddhism, and Zen. Questions of metaphysics, epistemology, and ethics are emphasized with reference to the nature of reality and the person, social harmony and self-realization, causality, right action, and enlightenment. Comparisons may also be made with Western philosophers, both contemporary and classical. **Lecture 3, Credits 3 (Spring)**

PHIL-312**American Philosophy**

This course examines the contributions of American philosophers from the colonial era to the present day. From the New England Transcendentalists of the 19th century, to the Pragmatism and Neo-Pragmatism of the 20th and 21st, American philosophy has responded to the demands of a pluralistic, ever-changing society. Because American philosophy is a reflection of American culture, it has also offered a unique perspective on perennial philosophical problems in ways that have differed sharply from dominant forms of European philosophy. Authors may include Ralph Waldo Emerson, Henry David Thoreau, Frederick Douglass, Susan B. Anthony, C.S. Peirce, Jane Addams, William James, John Dewey, Richard Rorty, and Cornel West. **Lecture 3, Credits 3 (Fall)**

PHIL-313**Philosophy of Film**

Introduces students to models of film interpretation and critique that arose in pre-war Europe and that have burgeoned since; these models combine philosophical, aesthetic, economic and psychoanalytic methods of analysis. Among the topics considered are the nature of the image, ideology and alienation, trauma, fetishism, magical realism, realism and anti-realism in film. **Lecture 3, Credits 3 (Fall)**

PHIL-314**Philosophy of Vision and Imaging**

This course examines how philosophers and others have understood the nature and primacy of sight. It explores how technologies of seeing and imaging have influenced theories of sight and our most dominant and authoritative practices of seeing and representing in the humanities and the arts, as well as in the natural and social sciences. The course will focus on the impact these theories and practices of seeing and representing both analogue and digital have on the nature of knowing, as well as on how they shape and mediate our experiences of personal and social identity and agency more generally. **Lecture 3, Credits 3 (Fall)**

PHIL-315**Responsible Knowing**

What we do is connected to what we know. Acting well depends on appropriate evaluation of perception, logic, and evidence, and acting on our beliefs commits us to various ethical outcomes. In addition, understanding how our minds work and how we produce knowledge in teams and institutions can improve the reliability of what we know and can assist us in achieving ethical goals. This course develops advanced critical thinking skills and investigates how knowledge claims and value claims interact in order to shed light on the conditions that make responsible knowing possible. We will study how we produce responsible knowledge individually and collectively: from how we make ethically rational choices in our own lives to how society directs research priorities in science and technology. Topics may include: rational decision-making, cognitive bias, moral psychology, social epistemology, epistemic, and ethical relativism, risk and uncertainty, research integrity, and values in science. **Lecture 3, Credits 3 (Spring)**

- PHIL-316 Bioethics and Society**
 This course introduces students to some of the ethical considerations and problems that arise in the context of medical practice, biological science, health care policy, and related research. Issues that may be covered include: abortion; stem cell research; human cloning; euthanasia; informed consent; human organ procurement; health care allocation and how it is approached in various countries; bioethical concerns arising from human caused climate change and other environmental issues impacting public health concerns around the globe. Students will become familiar with the concepts and principles of bioethics while engaging with case studies and related media. Part of the philosophy immersion, the ethics immersion, the global justice immersion, the philosophy minor, the ethics minor, and the philosophy major. May also be taken to fulfill the ethical perspective, the global perspective, or as an elective. **Lecture 3, Credits 3 (Spring)**
- PHIL-317 Renaissance Philosophy**
 This course provides an overview of the Renaissance (c. 1350-1650), one of the most important cultural revolutions of Western civilization affecting nearly all aspects of European life—the arts, the relation with the natural world, and the attitude toward religion, the past, and politics. The “Renaissance person” came to denote a universal individual whose knowledge spaces over the entire realm of experience. The overarching theme of the Renaissance – humanism – prefigures contemporary theories of posthumanism, transhumanism, and the critique of anthropocentrism in general. Thinkers considered in this course include Petrarca, Valla, Pompanazzi, Cusanus, Ficino, Pico della Mirandola, Machiavelli, Erasmus, Luther, Suárez, More, Bruno, Telesio, Copernicus, Kepler, Galileo, Montaigne, and Bacon. **Lecture 3, Credits 3 (Biannual)**
- PHIL-318 Philosophies of Love, Sex, and Gender**
 Love is indeed one of the most central concerns in everyone’s life; yet, we spend very little time thinking conceptually about love in its various forms, aspects, implications, nuances, benefits, detriments, and harms. In this course, we will examine views from classical, medieval, modern, and contemporary thinkers on various kinds of love, including some controversial versions of it; we will consider the relation of love in its various forms to desire, emotions, physical intimacy, seduction, sex, sexuality, sexual orientation, and the construction of personal identity; and we will analyze how the various forms of love affect and are affected by gender norms, roles, and images. **Lecture 3, Credits 3 (Biannual)**
- PHIL-401 Great Thinkers**
 An examination of the thought of some of those philosophers who have been most influential in the history of ideas. An attempt is made to cover in some depth the works of one or more of these great thinkers. The student will begin to recognize the enduring nature of some of our most pressing problems, as well as the intellectual foundation of proposed solutions. (Prerequisite: one course in philosophy, or permission of instructor) Class 3, Credit 3 (varies) (Prerequisites: Completion of one course in philosophy is required.) **Lecture 3, Credits 3 (Spring)**
- PHIL-402 Philosophy of Science**
 An examination of the nature of the scientific enterprise; possible discussion topics include the presuppositions of science, its logic, its claims to reliability, and its relationships to society and to problems of human values. (Prerequisites: Completion of one (1) course in philosophy (at the 200 level or higher) or a major in the College of Science or College of Health Science & Technology or PSYC-BS.) **Lecture 3, Credits 3 (Fall)**
- PHIL-403 Social and Political Philosophy**
 An examination of some of the main problems of social and political philosophy through an analysis, comparison and critical examination of various views concerning the natures of individuality and society and the relations between them. (Prerequisites: Completion of one (1) course in any of the following disciplines: PHIL, POLS, SOCI, or CRIM.) **Lecture 3, Credits 3 (Fall)**
- PHIL-404 Philosophy of Mind**
 The Philosophy of Mind includes issues of metaphysics, epistemology, logic, psychology, aesthetics, linguistics, cognitive science, artificial intelligence, and biology, to name a few. Issues to be investigated include: Is there an ontological difference between minds and bodies? Could there be minds without bodies? Can I know that I have a mind? Are there other minds in the universe? Can I be conscious of my own consciousness? Can other things have the kinds of experiences which I have? (Prerequisites: Completion of one course in philosophy is required.) **Lecture 3, Credits 3 (Fall)**
- PHIL-405 Philosophy of the Social Sciences**
 This course examines the methods, foundations, assumptions and purposes of the social sciences. In particular, it will examine the ways in which science and non-science are distinguished as well as the similarities and differences between the social and natural sciences. Special attention will be paid to the ways in which both Anglo-American and European philosophical traditions approach the social sciences. Other topics may include the role of values in social scientific inquiry, the processes of explanation and theory confirmation in the social sciences, and various conceptions of interpretation and meaning in the social sciences. The course will also examine how the tensions between claims of universality and claims of relativism, claims of objectivity and claims of partiality should be understood within the social sciences. (Prerequisites: Completion of one (1) prior course in philosophy (at the 200 or 300 level) or a major in CRIM-BS, PSYC-BS, INGS-BS, SOCANT-BS, POLS-BS, ECON-BS, or PUBL-BS.) **Lecture 3, Credits 3 (Spring)**
- PHIL-406 Contemporary Philosophy**
 This course examines developments in philosophy since 1900. During this time philosophy evolved along with science, politics, and the arts. In some cases philosophy responded to new discoveries and theories while at other times it precipitated movements that had far-reaching effects. A range of philosophical approaches may be discussed, including existentialism, experimental philosophy, feminist theory, hermeneutics, logical positivism, neo-pragmatism, phenomenology, and postmodernism. The connections among different approaches may also be addressed. (Prerequisites: Must have completed at least one PHIL course - 200 level or higher.) **Lecture 3, Credits 3 (Fall)**
- PHIL-407 Philosophy of Action**
 This course explores the three central philosophical issues of action theory: what is an action, what is an agent, and what is metaphysical freedom. The first part of the course examines the most significant theories of action and the different ways in which they characterize intentional behavior. The second part of this course explores the nature of agency. The third part of this course focuses on the classical problem of free will and its relation to moral responsibility. (Prerequisites: Completion of one course in philosophy is required.) **Lecture 3, Credits 3 (Spring)**
- PHIL-408 Critical Social Theory**
 Introduces students to models of cultural critique that arose in pre-war Germany and that have burgeoned in our contemporary aesthetic and philosophical practices. These models combine philosophical, aesthetic, economic and psychoanalytic methods of analysis. Among the topics considered are alienation and reification, hegemony or false consciousness, trauma, fetishism, the authoritarian personality and state, advertising and modern technology, and the relative autonomy of art. (Prerequisites: Completion of one course in philosophy is required.) **Lecture 3, Credits 3 (Spring)**
- PHIL-409 Existentialism**
 Existentialism is distinguished by its emphasis on human existence and the way its meaning is created through actions and choices. Existentialism focuses on the concept of individual freedom in an effort to respond authentically to the possibilities which life presents, emphasizing the importance of certain psychological states (e.g., anxiety, anticipation of death, fear, care, responsibility, and hope) and extreme situations in bringing us to an awareness of our radical freedom. This course will consider such philosophers and writers as Dostoevsky, Kierkegaard, Nietzsche, Berdyaev, Heidegger, Jaspers, Camus, Sartre, Kafka, Beauvoir, Marcel, Buber, Ortega, and Unamuno. (Prerequisites: Completion of one course in philosophy is required.) **Lecture 3, Credits 3 (Fall)**
- PHIL-410 Medieval Philosophy**
 This course is an introduction to the philosophical thought during the medieval period (approximately 300 C.E. to 1500 C.E.). It will consider the thought of various major figures from the Christian, Jewish, and Islamic traditions, and will take up this period’s two principal areas of concern: the philosophy of religion and theology, on the one hand, and metaphysics and epistemology, on the other. (Prerequisites: Must have completed at least one PHIL course - 200 level or higher.) **Lecture 3, Credits 3 (Spring)**
- PHIL-411 Metaphysics**
 Metaphysics is the study of the general features of existence or reality. This course focuses on the fundamental concepts of being as developed in several major philosophers from the Greeks to the present. Discussion will focus on such topics as God, time, space, substance, essence, existence, process, causality, possibility, necessity, chance, and value. (Prerequisites: Must have completed at least one PHIL course - 200 level or higher.) **Lecture 3, Credits 3 (Spring)**

PHIL-412**Nineteenth Century Philosophy**

The nineteenth century marks a radical shift in the history of philosophy and culture and stands in its own right as a distinct period of thought between the modern era and the contemporary era. This course will consider such philosophical positions as idealism, empiricism, existentialistic romanticism, Marxism, evolution, nihilism, positivism, pragmatism, and the role of the arts and aesthetics. Philosophers considered include Schelling, Fichte, Hegel, Schopenhauer, Mill, Marx, Darwin, Kierkegaard, Nietzsche, Comte, Bradley, Green, Peirce, and James. (Prerequisites: Must have completed at least one PHIL course - 200 level or higher.) **Lecture 3, Credits 3 (Fall)**

PHIL-413**Philosophy of Literature**

Introduces students to models of literary theory from the mid-twentieth century to the present and familiarizes them with the key works of literature to be analyzed. Prepares students to practice questioning and critiquing texts using the philosophical, aesthetic, economic and psychoanalytic methods of analysis which have come to form the foundation of contemporary literary theory. Among the topics considered are culture and imperialism, performativity, the encounter of modern literature and modern technology, structuralism and semiotics, the role of psychoanalysis, the role of the academy, and the relative autonomy of art. (Prerequisites: Completion of one course in philosophy is required.) **Lecture 3, Credits 3 (Fall)**

PHIL-414**Philosophy of Language**

This course examines how philosophers and others have understood the nature of language. It explores the classical philosophical contexts in metaphysics, epistemology, aesthetics and rhetoric in which concerns about the nature of language arose. In addition, the course focuses on recent debates, within both contemporary analytic and continental traditions of philosophy. Some likely areas of inquiry will be: theories of reference, description and naming; theories of meaning, metaphor and narrative; functionalist, pragmatist and naturalist accounts; structuralist, post-structuralist, and hermeneutic accounts, among others. The prominence of one or the other of these debates and approaches will vary. (Prerequisites: Completion of one course in philosophy is required.) **Lecture 3, Credits 3 (Spring)**

PHIL-415**Ethical Theory**

This course examines the theoretical basis of ethics and morality, namely the theoretical commitments that enter into any judgment that a particular action is right or wrong, with special emphasis on a particular thinker or theoretical approach. Topics may include different ways of understanding the concepts of right and wrong; the existence or non-existence of moral facts; different criteria of moral actions; different conceptions of the good life. (Prerequisites: Completion of one course in philosophy is required.) **Lecture 3, Credits 3 (Spring)**

PHIL-416**Seminar in Philosophy**

Examines some area of philosophy at an advanced undergraduate level. The area examined may vary from semester to semester. The seminar is designed especially for those whose interest in philosophy goes beyond the requirements of the liberal arts curriculum. (Prerequisites: Completion of two (2) courses in philosophy is required.) **Lecture 3, Credits 3 (Spring)**

PHIL-417**Continental Philosophy**

This course will provide an overview of some of the major currents in Continental philosophy, the distinctive philosophical approach and style of thinking that emerges in the early 20th century largely as a critical response to German Idealism, Marxism, and the antecedent existentialism of Kierkegaard and Nietzsche. Continental philosophy is rooted in the history of philosophy, attentive to the world of experience, and develops in constant conversation with various other areas of human activities such as literature, politics, psychoanalysis, and religion. Among the major currents to be examined in the course are phenomenology, hermeneutics, deconstruction, structuralism, poststructuralism, French feminist theory, posthumanism, and speculative realism. Traditional philosophical topics such as ontology, metaphysics, epistemology, language analysis, feminist theory, ethics, and politics will be considered in the light of their reassessment by Continental philosophy. Figures covered may include Husserl, Heidegger, Merleau-Ponty, Gadamer, Foucault, Levinas, Deleuze, Nancy, Derrida, Agamben, Irigaray, and Žižek, among others. (Prerequisites: Must have completed at least one PHIL course - 200 level or higher.) **Lecture 3, Credits 3 (Spring)**

PHIL-449**Topics in Philosophy**

A critical examination of issues in some area of philosophy not covered in other philosophy courses. (Prerequisites: Completion of one course in philosophy is required.) **Lecture 3, Credits 3 (Fall, Spring)**

PHIL-499**Philosophy Co-op**

One semester of work experience in a professional setting related to the philosophy major. **CO OP, Credits 0 (Fall, Spring, Summer)**

PHIL-510**Advanced Research in Philosophy**

This individualized course is designed to give students first-hand experience working on a research project under the guidance of a sponsoring faculty member. Students in this course will pursue research and develop relevant research skills under the direction of a Philosophy faculty member. Prior to enrollment in this course students must submit a research proposal to their faculty sponsor, who will forward it to the Philosophy Department for approval. The proposal should specify the topic and goal of the research project and a venue for public dissemination. **Research 1, Credits 1 - 3 (Biannual)**

PHIL-595**Senior Thesis in Philosophy**

This course is required of philosophy majors during their senior year. A student will choose a faculty member to serve as a primary advisor. With the advisor's guidance, a student will research and write a substantial paper on a specific philosophical topic. Students will be encouraged to investigate a particular question in depth, likely building on earlier course work. The finished thesis will be discussed and examined by a committee including two other faculty members. (Prerequisites: PHIL-416 or equivalent course and 4th year level.) **Seminar, Credits 3 (Fall, Spring)**

PHIL-599**Independent Study**

A program of study executed by an individual student with assistance and guidance by an instructor, outside a classroom setting. Guidelines for designing and gaining approval for an independent study are provided in the College of Liberal Arts Policy I.D. **Ind Study, Credits 1 - 9 (Fall, Spring, Summer)**

Political Science**POLS-110****American Politics**

This course examines the basic principles, themes and institutions of American politics. The course will approach the study of American politics from four interrelated topics: 1) American political values and constitutional foundations; 2) mass politics and political socialization; 3) political institutions; and 4) public policy. Current events will be discussed throughout the course in an effort to promote responsible citizenship. In addition to providing a basic overview of American politics, this course seeks to develop critical thinking, group dynamic and communication skills that are transferrable outside the classroom. **Lecture 3, Credits 3 (Fall, Spring)**

POLS-110H**Honors Political Science**

This course explores the founding principles of the American political order and their contemporary relevance. In addition, the course will examine the extent to which the three political institutions of American government (legislature, executive, and judiciary) have either adhered to or departed from the founding principles. Emphasis will be placed upon reading and analyzing primary sources from the founding era and some of the more influential perspectives on American government drawn from the Civil War period to the 20th century. (Prerequisites: POLS-110 or POLS-110H or POLS-120 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

POLS-115**Ethical Debates Amer Politics**

This course examines past and contemporary political and ethical debates that have shaped, clarified and transformed the meaning of the foundations of the American democratic-republic. At every turn, political and ethical debates in American politics have focused on the meaning of the principles of equality and consent and the moral implications of individual rights. The course will address topics such as the moral foundations of the Founding, the moral character of the Union, the injustice of slavery in a regime dedicated to the principle of equality, justice and the Civil Rights movement, and the progressive critique of the Founding, the rise of the entitlement state and its critiques, as well as current political and ethical controversies. Special attention will be paid to the political speeches of those directly involved in the debates. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

POLS-120**Introduction to International Relations**

The purpose of this course is to provide a basic knowledge of the field of international relations. Among the topics to be addressed are key theoretical concepts, themes and controversies in the field such as: important state and non-state actors in international politics, security, economic relations between states, levels of analysis, and schools of thought. **Lecture 3, Credits 3 (Fall, Spring)**

POLS-200**Law and Society**

This course focuses on the relationships between law and other social institutions, and examines the values and interests that are expressed in law and shaped by legal structures and processes. This course takes an explicit interdisciplinary approach to understanding law and is designed for those interested in a critical inquiry of the nature of law within a framework of a broad liberal arts education. **Class 3, Credit 3 (F) Lecture 3, Credits 3 (Spring)**

POLS-205 **Ethics in International Politics**
This course examines the role of ethics in international politics. It will address topics such as humanitarian intervention, just war, the ethics of immigration, international economic justice, accountability in international development aid, and the ethical role of international organizations and non-state actors. Special attention will be given to thinkers who discuss the promise and limits of ethics in international politics and who give an account of the force of international law in establishing ethical norms throughout international political history. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

POLS-210 **Comparative Politics**
The course provides a mode of analysis for the study of political systems. Basic concepts of political science are utilized to present a descriptive and analytical examination of various political systems that can be classified as liberal democracies, post-communist, newly industrializing countries, and Third World. Particular attention is paid to the governmental structure, current leadership and major issues of public policy of those selected political systems under review. **Lecture 3, Credits 3 (Spring)**

POLS-215 **Tech, Ethics and Global Politics**
This course examines the mutual influence of science, technology and global politics within the framework of international ethics. Contemporary debates around drones, climate change, cyber security, the Ebola pandemic, hydraulic fracturing, renewable energy, nanotechnology, biotechnology, and nuclear power reveal the field of International Relations must take scientific and technological developments more seriously. In order to comprehend the mutual influence of science, technology, and global politics, the course will examine the political project of the early moderns, who sought the removal of traditional, moral restraints on scientific and technological innovations, as well as the international efforts to regulate scientific and technological innovation beginning in the twentieth century and continuing to the present day. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

POLS-220 **Global Political Economy**
Examines the interplay between states and markets, as well as the interaction of the global economy and international politics. The course will cover political economy, political ideology, global trade, international capital investment, debt, the integration of national financial markets, and the impact of globalization on society and the environment. **Lecture 3, Credits 3 (Fall or Spring)**

POLS-250 **State and Local Politics**
This course is a study of politics and government on the state and local levels, as well as the relationships between these levels and the federal government. The first focus of the course is on the federal system of government, including the interdependence of the three levels of government. The course continues by examining the state level followed by a focus on local government. A final topic is policy-making, including revenues and expenditures, which again illustrate the interrelationship of the three levels. **Lecture 3, Credits 3 (Fall)**

POLS-280 **Artificial Intelligence and the Political Good**
This course examines the political promises and challenges of artificial intelligence (AI) through the consideration of the technological trajectories and possible scenarios of advanced AI. Possible discussion topics may include: The compatibility of AI with the political principles of liberty, equality, and the pursuit of happiness to understanding what an AI arms race between countries might entail. Domestically, will the prospect of greater job automation produce mass unemployment with severe consequences? Globally, will the weaponization of AI make going to war easier? Questions like these are inherently political and the movement toward greater AI capabilities raises the more general question of whether humanity will be able to regulate, both domestically and globally, a technology that promises to surpass all technology that has gone before it. This course will seek to anticipate and prepare for the risks that advanced AI poses to domestic and global politics. The goal will be to think about how advanced AI can be prudentially oriented toward beneficial practices for the sake of the political good. **Lecture 3, Credits 3 (Spring)**

POLS-285 **Environmental Ethics and Political Ecology**
This course examines environmental issues through a variety of political and ethical perspectives. The goal of the course is to understand how the meaning of political and ethical concepts (e.g., citizenship, justice, responsibility, security, sovereignty) have been broadened or reinterpreted in light of the ascendancy of environmentalism. For instance, the course will cover questions concerning whether environmentalism has encouraged a more precautionary sort of politics, especially in regard to agricultural biotechnology, along with how it has transformed the traditional military definition of security to include new notions such as climate or food security. To address these questions and issues, the course fosters an appreciation of the ethical reasoning of the interdisciplinary field known as political ecology. An emphasis on the ethical reasoning of political ecology will facilitate a more comprehensive understanding of environmental issues through unraveling the political forces at work in environmental change at both the global and local levels. **Lecture 3, Credits 3 (Fall, Spring)**

POLS-290 **Politics and the Life Sciences**
This course examines the intersection between politics and the life sciences. The course will examine the biological approach to human behavior, paying special attention to the implications of biological explanations of behavior for political systems. Topics to be covered may include the biological approach to morality, law, and international conflict, as well as the political and policy implications of new research in the biological sciences including biotechnology. **Lecture 3, Credits 3 (Fall)**

POLS-295 **Cyberpolitics**
Innovations in digital communication technologies have the potential to affect many aspects of politics and government. Beyond specific elements such as elections and delivery of government services, these developments have the potential to expand and redefine the nature of political participation and civic engagement, and to alter the structure of political power. This course examines the potential and promise of digital democracy, and attempts to separate hype from reality. **Lecture 3, Credits 3 (Spring)**

POLS-300 **Rhetoric and Political Deliberation**
Often political deliberation requires reasoning about indeterminate subjects of public import, which do not permit us to arrive at incontestable conclusions. Even where there is compelling evidence the conclusions of political deliberation usually require rhetorical assistance. Rhetoric reflects an appreciation that the simple truth and scientific facts do not suffice in all circumstances, that citizens sometimes have to be persuaded and led through persuasive speeches to reach reasonable decisions in public life. This course examines the role of rhetoric in political deliberation through a consideration of some of the most politically important speeches in American and international politics. The course will also consider the political use of rhetorical devices as well as the differences between deliberative, epideictic and forensic rhetoric. As a writing intensive course, students will practice the writing conventions associated with the discipline and their skills in editing, revising, and reviewing their writing and the writing of their peers. **Lecture 3, Credits 3 (Fall or Spring)**

POLS-305 **Political Parties and Voting**
Political parties are a crucial part of the democratic process, as are elections. Parties and elections serve as a critical link between citizens and their government, as parties and candidates promote policies favored by voters. This course studies parties, their history, their future and their role in the democratic process. Overall emphasis is on the degree to which parties perform or fail to perform as a link between citizens and government. **Lecture 3, Credits 3 (Fall)**

POLS-310 **The Congress**
This course examines the role of the Congress in American government. Topics studied include elections, party organization, committees, interest-group activities and executive-legislative relations. **Lecture 3, Credits 3 (Spring)**

POLS-315 **The Presidency**
A study of the role of the presidency in the American political system. Among the topics considered are the nomination and election processes, the evolution, expansion and limitation of presidential power, factors in decision-making and the various leadership functions performed by the president. **Lecture 3, Credits 3 (Fall or Spring)**

POLS-320 **American Foreign Policy**
A study of the formulation and execution of American foreign policy, including the examination of the instruments, procedures, and philosophies shaping the development of foreign policy. **Lecture 3, Credits 3 (Fall or Spring)**

POLS-325 **International Law and Organizations**
The study of international law and organizations is the study of international cooperation and governance. The course will cover a variety of theoretical and substantive topics including the theories of international law and organizations, the historical development of international organizations, how these organizations work in practice, and whether they are effective. Emphasis will be placed on the United Nations and the role and usefulness of nongovernmental organizations in international organization. Several of the substantive issues discussed are interstate violence and attempts to address humanitarian concerns, globalizations, and the environment. **Lecture 3, Credits 3 (Fall)**

POLS-330 **Human Rights in Global Perspective**
This course explores the theoretical meaning, both domestically and internationally, and the institutional and political aspects of human rights. Issues covered include the definition of human rights; the relationship between civil and political rights and economic, social and cultural rights; the meaning and impact of humanitarian and international human rights law; the impact of cultural relativism in the definition and assessment of the promotion and protection of human rights; the significance of different religious perspectives; the question of the legitimacy of humanitarian interventions and the effects of globalization on human rights perceptions and practices. **Lecture 3, Credits 3 (Fall, Spring)**

POLS-332**The Rhetoric of Terrorism**

This class examines the history of terrorism (both the concept and the term), definitions of terrorism and attempts to explain the root causes of terrorism through rhetorical and ethical analysis of narratives written by historians, journalists, and terrorists themselves. Students will read and discuss charters, manifestoes and messages (terrorism texts) of domestic and foreign, regional and global, non-state entities motivated by politics or religion to commit violence, as well as the efforts of analysts to explain and contextualize their activities. **Lecture 3, Credits 3 (Fall)**

POLS-335**Politics in Developing Countries**

This course explores the ways in which the historical, cultural, economic and political contexts of societies of Africa, Asia and Latin America determines the patterns of their political processes. Focus is directed to such factors as history, religion, economic underdevelopment, and culture and their impact on the efforts to promote liberalization and democratization, economic and social modernization, and political and social stability. **Lecture 3, Credits 3 (Fall)**

POLS-340**Medicine, Morality, and Law**

This course provides health sciences and other students with a background in the changing face of medical ethics over the last two hundred years. The course combines medical history, historical and contemporary biomedical ethics, philosophy of science, and political theory to create a framework for understanding the complexity and depth of the practitioner/patient relationship. At the end of the course, students will explore and interrogate the way in which the practical, ethical, legal, and political framework of modern American medicine supports or challenges foundational medical principles like patient autonomy and the Hippocratic Oath. Resources include works by William Osler on humanistic medicine as well as other foundational medical thinkers, classic works in bioethics, and historical and narrative accounts of the consequences of medical abuse. Examples of possible texts include archival documents related to the eugenics movement in 20th century America, letters and testimony from survivors of the Tuskegee Syphilis Study, and contemporary texts and court cases that interrogate the connection between medical practice and human values and meaning. **Lecture 3, Credits 3 (Fall, Spring)**

POLS-345**Politics and Public Policy**

A study of the politics of the policy process covering these basic questions: How do public problems get to the agenda of government? How does government formulate policy alternatives? How does government legitimate public policy? How does government implement public policy? How does government evaluate public policy? **Lecture 3, Credits 3 (Fall)**

POLS-350**Politics of East Asia**

This course examines the East-Asian countries using the following comparative criteria as the organizing guidelines: modern political history of the country, political economy and development, governance and policy making, representation and participation, as well as major domestic and foreign policy issues. The political prospects of the countries for the 21st century will be analyzed and discussed. **Lecture 3, Credits 3 (Fall)**

POLS-351**Politics of China**

This course examines the politics of China through a comparative historical analysis of key political and economic developments. It discusses the Communist Revolution, governance and policy making under the communist regime, and the reforms following the introduction of capitalism. The goal of the course is to assess China's comparative advantages and grand strategy in international politics. (Prerequisites: POLS-210 or equivalent course.) **Lecture 3, Credits 3 (Spring, Summer)**

POLS-355**Political Leadership**

The fundamental proposition of this course is that political leadership makes a crucial difference in the life of a nation. The course will examine how leadership may serve as either a constructive or destructive force in the pursuit of some shared, national goal or purpose. The course will consider a diverse range of leaders and their respective styles and types of leadership. Each leader will be studied in terms of his or her historical context, the means and ends each employed in the pursuit of political goals, and the particular qualities both virtues and vices each embodied as a political leader. **Lecture 3, Credits 3 (Fall)**

POLS-360**International Political Thought**

The course provides a general overview of international themes, ethical principles, and issues that are taken into consideration in international political thought. Possible topics may include theoretical analyses of the ideas of sovereignty, nationalism, hegemony, imperialism, global civil society, political theory, balance of power, collective security, just war, perpetual peace, and human rights. Guiding themes of the course will be a reflection upon the nature of political legitimacy in the international context and the tension between political justifications based upon necessity and those based upon justice. In reading the major political thinkers students will be encouraged to reflect upon the challenge of reconciling ethical obligations to one's own community with those of humanity in general. **Lecture 3, Credits 3 (Fall, Spring)**

POLS-365**Anarchy, Technology and Utopia**

This course examines the way in which new technologies challenge and provide alternatives to traditional political structures and functions. The course discusses the moral status of the state through the lens of anarchic political thought, with an emphasis on the concept of consent. Themes of anarchic thought are then discussed in light of how new technologies decentralize power and challenge traditional state goals, such as regulation or state secrecy. Technologies to be discussed include social media platforms and nongovernmental, digital currency, as well as decentralized energy sources like solar and wind. The ethical and moral implications of these new technologies, the harms and benefits they present, and their use as challenges to the moral status of the state are all central themes. **Lecture 3, Credits 3 (Biannual)**

POLS-370**Cyberwar, Robots, and the Future of Conflict**

This course examines how advances in computer science, robotics, biotechnology and other emerging technologies are being applied to organized violence. Emphasized are the ways that lethal uses of unmanned aerial vehicles (drones), warbots with artificial intelligence, cyber-attacks, and other emerging technologies are changing or will change the character of war and the societies that enact it. Special attention is given to the ethical and legal dilemmas these technologies present to citizens, states, and the international community, assessing both the harm and the good that they make possible. **Lecture 3, Credits 3 (Fall)**

POLS-375**Grand Strategy**

Grand strategy defines the interests of a state, the means necessary to achieve and protect those interests, the threats to those interests, and the policies and military forces needed to minimize the danger posed by those threats. This course examines grand strategies of great powers from various historical eras and regions to determine the origins of grand strategy and the relationship between a great power's grand strategy and stability in international politics. The focus on a specific regime or regimes will be determined by the instructor and announced in the subtitle. The course can be repeated as the area of focus changes. **Lecture 3, Credits 3 (Fall, Spring)**

POLS-390**Greece and the Political Imagination**

As a region once comprised of many city-states, transformed into an empire, occupied by foreign armies, and now unified as a nation-state, Greece plays a pivotal role in the political imagination. Themes of freedom, war, justice, heroism, piety, beauty, love, tyranny, democracy, colonialism, nationalism, immigration, and sovereignty pervade its rich literary, artistic, and intellectual heritage. This course examines how these themes are expressed in literary and artistic political works that reflect the history of Greece in all of its variety. These themes are also discussed through a survey of Greek political philosophy from antiquity to the present. **Lecture 3, Credits 3 (Spring)**

POLS-390H**Greece and the Political Imagination**

As a region once comprised of many city-states, transformed into an empire, occupied by foreign armies, and now unified as a nation-state, Greece plays a pivotal role in the political imagination. Themes of freedom, war, justice, heroism, piety, beauty, love, tyranny, democracy, colonialism, nationalism, immigration, and sovereignty pervade its rich literary, artistic, and intellectual heritage. This course examines how these themes are expressed in literary and artistic political works that reflect the history of Greece in all of its variety. These themes are also discussed through a survey of Greek political philosophy from antiquity to the present. The class will meet regularly on the Rochester campus in the spring semester for discussions and assignments. After the spring semester, coursework will continue in the summer while studying abroad for two to three weeks in Greece, which is mandatory. Students will receive an "Incomplete" in the spring semester, which will be changed after completing the summer travel **Seminar 3, Credits 3 (Spring)**

POLS-410**Evolutionary International Relations**

This course examines the biological explanations of international conflict. Topics will include the evolutionary approach to human behavior, international conflict, and the relevance for evolutionary explanations as an alternative or supplement to current paradigms of international relations like realism and rational choice. Finally, the course will look at what an evolutionary understanding of politics means for peace-keeping missions, global governance, and the stability of international cooperation. **Lecture 3, Credits 3 (Fall)**

POLS-415**Evolution and the Law**

This course examines the evolutionary approach to law. The course will consider the relevance of evolutionary theory to the analysis of law, the roots of rule of law, the relationship between natural law and common law, as well as the strengths and limitations of the evolutionary approach to specific themes within law, such as property law and family law. **Lecture 3, Credits 3 (Spring)**

POLS-420**Primate Politics**

This course examines the biological approach to the study of political order. Students will learn about the basic political structures of the great apes, how they differ, and how an understanding of these primate social structures can help us understand human political behavior. Specific topics might include the biological explanations of patriarchy and matriarchy, the biology of dominance structures, and the biology of leadership choice. **Lecture 3, Credits 3 (Spring)**

College of Liberal Arts

- POLS-425** **Constitutional Law**
A study of the Constitution of 1787 and the manner in which it was written. The focus of the course is on the way the people have, through the Constitution, delegated powers and responsibilities of government to the Congress, the President, the Courts and the States. Selected Supreme Court opinions will be considered to shed light on how the Constitution has been read and how thoughtful citizens might read it. **Lecture 3, Credits 3 (Fall)**
- POLS-430** **Constitutional Rights and Liberties**
This course provides an introduction to the Supreme Court's legal and political reasoning on the civil rights and liberties contained in the Bill of Rights. Particular emphasis will be placed on the First Amendment as the cornerstone of a free society guaranteeing religious liberty and the right to free speech. The course will also examine how the Court has balanced constitutional rights and liberties in the First, Fourth, Fifth and Sixth Amendments against the need for enhanced national security. **Lecture 3, Credits 3 (Spring)**
- POLS-435** **American Political Thought**
Provides a general overview of the political ideas, concepts, issues and principles which taken together compose the stream of American political thought. Examines major controversies, which have marked the developing body of the literature by examining the contributions of major political thinkers. **Lecture 3, Credits 3 (Spring)**
- POLS-440** **War and the State**
Explores the enduring reality of war through an analysis of regional and global conflicts since the establishment of the modern international system. Key concepts include deterrence, appeasement, offensive-defensive military strategies, and international balances of power. These will be applied to several historical cases to explain why wars occur and how they might be avoided. **Lecture 3, Credits 3 (Fall or Spring)**
- POLS-445** **Terrorism and Political Violence**
This course examines the causes, methods, and responses of non-state groups attempting to establish new political orders. The combined use of violence with the tactic of terror distinguishes these groups from others seeking political change. Special attention will be given to national and international efforts attempting to resolve such conflicts. **Lecture 3, Credits 3 (Fall or Spring)**
- POLS-455** **Comparative Public Policy**
Modernization theorists predict, industrial and post-industrial societies tend to face similar public policy issues in such areas as public education, health care, public transportation, public housing and the environment. However, the political responses to these challenges have varied in significant ways in different countries. Many states have developed extensive welfare state systems, while some have put more emphasis on market-based solutions. The course seeks to explore and analyze the factors that explain these differences and assess the extent to which the different approaches succeed in meeting these policy challenges. **Lecture 3, Credits 3 (Fall)**
- POLS-460** **Classical Constitutionalism, Virtue and Law**
This course will examine the classical quest for personal and political order. It will concentrate on the foundations of classical political science and its search for the best regime. The course will also examine the classical understanding of constitutionalism, or the regime as the form for encouraging virtue through the rule of law, in contrast to the modern view that attempts to combine liberty and property. Along the way, the enduring questions of cosmology, human nature, justice and the good will be examined. **Lecture 3, Credits 3 (Fall)**
- POLS-465** **Modern Constitutionalism, Liberty and Equality**
This course examines the founding principles of modern constitutionalism and the modern state. Special attention will be paid to the theory and practice of the principles of equality, liberty, and consent. A major effort throughout the course will be made to consider the assessments and prescriptions for modern constitutionalism offered by American and continental political thinkers. **Lecture 3, Credits 3 (Spring)**
- POLS-481** **Women in Politics**
A study of feminist thought as it applies to the political, economic and social status of women and how it has been expressed through the women's political movement. Students study a number of public policies as they apply to and affect women and examine the opportunities for women to participate in the political process. **Lecture 3, Credits 3 (Spring)**
- POLS-485** **Politics Through Fiction**
This course explores contemporary issues facing the American and global political order through the lens of fiction. Particular attention will be paid to the grounds of sound political deliberation, the limitations of prudence and the theory and practice of American political principles both home and abroad. **Lecture 3, Credits 3 (Spring)**
- POLS-490** **Politics Through Film**
This course explores the enduring issues facing the American and global political order through the lens of film. Particular attention will be paid to the principles of sound political deliberation, the limitations of political leadership and the theory and practice of American political principles both at home and abroad. **Lecture 3, Credits 3 (Spring)**
- POLS-515** **Experiential Learning: Political Science**
The purpose of the Experiential Learning: Political Science option is to give students first hand experience in an appropriate organization or study abroad program that meets the needs of the student's career objectives. Students are closely supervised at the host organization, developing their pre-professional skills while learning the organizations programs, agenda and methods. **CO OP, Credits 0 (Spring, Summer)**
- POLS-525** **Special Topics in Political Science**
Special topics will examine a political theme, issue or problem at an advanced undergraduate level. The subject matter examined will vary from year to year according to the availability of faculty and the interests of students. The course is designed especially for those whose interest in politics goes beyond the requirements of the liberal arts curriculum. (Class 3, Credit 3 (varies)) **Lecture 3, Credits 3 (Fall or Spring)**
- POLS-530** **Political Science Capstone**
This seminar provides an opportunity to study in-depth any theme, problem or work within the discipline of political science, for example the foundations of self-government, foreign policy, international law and organizations, and the fundamental problems of international relations. Course content will be determined in consultation with the instructor. Teams of students will write a substantial paper on a topic related to the general themes of the seminar. (This class is restricted to students in POLS-BS with 3rd or 4th year standing.) **Lecture 3, Credits 3 (Fall or Spring)**
- POLS-541** **Peacekeeping and Conflict Transformation**
This course will provide an introduction to the dynamics of post war stabilization and reconstruction. It will address the complexities of the transformation from war to peace, including interdependent politics, security, legal and economic elements. Students will discuss these patterns in the cases in Eurasia, the Middle East and Africa. Students will learn about analysis, planning, operations, and reporting used in national and multilateral agencies. **Lecture 3, Credits 3 (Summer)**
- POLS-542** **War, Diplomacy, and State-Building**
This course will explore the process by which states disintegrate and fail, the armed conflicts that follow, and international peacekeeping and subsequent efforts to build institutions at the end of armed conflicts. It will consider cases that might include the wars of Yugoslav Succession, conflicts in Iraq, Afghanistan, Africa, Syria and others. Students will consider the role of domestic and international actors, such as NATO, the US Government, the UN, and others. They will explore these efforts in readings, class discussion, debates, presentation of research, and role-playing exercises. **Lecture 3, Credits 3 (Summer)**
- POLS-599** **Independent Study**
A student may register for an independent study project subject to the approval of the faculty sponsor, student's department, the academic committee of the college of liberal arts and the dean of the college of liberal arts and providing that she or he has a minimum GPA of 2.7 at time of application. An independent study project is not a substitute for a course. It enables the interested student and his or her faculty sponsor to coordinate their efforts on subjects and topics that range beyond the normal sequence of course selection. (Prerequisites: POLS-110 or POLS-110H or POLS-120 or equivalent courses.) **Ind Study, Credits 1 - 3 (Fall, Spring, Summer)**
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- ## Psychology
- PSYC-101** **Introduction to Psychology**
Introduction to the field of psychology. Provides a survey of basic concepts, theories, and research methods. Topics include: thinking critically with psychological science; neuroscience and behavior; sensation and perception; learning; memory; thinking, language, and intelligence; motivation and emotion; personality; psychological disorders and therapy; and social psychology. **Lecture 3, Credits 3 (Fall, Spring, Summer)**
- PSYC-101H** **Honors Introduction to Psychology**
A state-of-the-art survey of major subfields in psychology and the scientific study of behavior and mental processes. Topics include: a critical evaluation of psychological science; neuroscience and behavior; sensation and perception; learning; memory; thinking, language, and intelligence; motivation and emotion; personality; psychological disorders and therapy; and social psychology. The course focuses not only upon understanding the behavior of the individual, but also upon understanding how the individual acts within groups and reacts to group membership. Besides textbook reading, students will read and discuss current publications on the topics we explore, including examination of the scientific method (including validity and reliability) employed in published studies. **Lecture 3, Credits 3 (Fall, Spring)**

PSYC-102**Introductory Topics in Psychology**

This course focuses on current issues and subfields in the field of psychology that are not distinctly incorporated in the established Psychology course offerings at an introductory level. This course concentrates on student discussion and interaction related to required readings. Students may repeat the course but may not repeat the topic. **Lec/Lab 1, Credits 1 - 3 (Fall, Spring, Summer)**

PSYC-221**Abnormal Psychology**

This course will serve as an introduction to the study of psychopathology and mental illness. The course examines the major categories of mental disorder not only from the descriptive point of view, but also in terms of the major theoretical explanations of the causes of disorder. The major treatment modalities also are covered. (Prerequisites: PSYC-101 or PSYC-101H or completion of one (1) 200 level PSYC course.) **Lecture 3, Credits 3 (Fall, Spring)**

PSYC-221H**Honors Abnormal Psychology**

This course will serve as an introduction to the study of psychopathology and mental illness. The course examines the major categories of mental disorder not only from the descriptive point of view, but also in terms of the major theoretical explanations of the causes of disorder. The major treatment modalities are also covered. This honors course will consist of seminar-style discussions of major course topics as well as independent research work to explore topics related to abnormal psychology in greater depth than the standard abnormal psychology course. (Prerequisite: PSYC-101 or PSYC-101H or equivalent course.) **Lecture 3, Credits 3 (Annual)**

PSYC-222**Biopsychology**

Introduction to the field of behavioral neuroscience, the study of neurobiological basis of cognition and behavior. Topics include neuroanatomy and physiology, localization of function, brain injury, research methods in behavioral neuroscience, and biological basis of language, memory, emotion, conscious states, and sexual behavior, with an evolutionary perspective. (Prerequisites: PSYC-101 or PSYC-101H or completion of one (1) 200 level PSYC course.) **Lecture 3, Credits 3 (Fall, Spring)**

PSYC-223**Cognitive Psychology**

This course examines how people perceive, learn, represent, remember and use information. Contemporary theory and research are surveyed in such areas as attention, pattern and object recognition, memory, knowledge representation, language acquisition and use, reasoning, decision making, problem solving, creativity, and intelligence. Applications in artificial intelligence and human/technology interaction may also be considered. (Prerequisites: PSYC-101 or PSYC-101H or completion of one (1) 200 level PSYC course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

PSYC-224**Perception**

This course covers perception in all of the sensory modalities (vision, hearing, taste, smell, touch). We will trace what happens to the physical stimulus as our sensory systems analyze it to produce complicated perceptions of the world around us. We will explore the fact that many complex perceptual phenomena draw upon explanations at the physiological, psychological, and cognitive levels. Topics on sensory perception in non-human animals may also be covered. This is a required course for psychology majors in the visual perception track. (Prerequisites: PSYC-101 or PSYC-101H or completion of one (1) 200 level PSYC course.) **Lecture 3, Credits 3 (Fall, Spring)**

PSYC-224H**Honors Perception**

This course covers perception in all of the sensory modalities (vision, hearing, taste, smell, touch). We will trace what happens to the physical stimulus as our sensory systems analyze it to produce complicated perceptions of the world around us. We will explore the fact that many complex perceptual phenomena draw upon explanations at the physiological, psychological, and cognitive levels. Topics on sensory perception in non-human animals will also be covered as relevant. This honors course will consist of seminar-style discussions of different topics each week, informed by primary sources, and will include independent research in which students explore topics related to perception in greater depth than the standard course. (Prerequisites: PSYC-101 or PSYC-101H or completion of one (1) 200 level PSYC course and Honors status or students with at least a 3.3 cumulative GPA.) **Lecture 3, Credits 3 (Biannual)**

PSYC-225**Social Psychology**

This course explores topics related to behaviors and mental processes of individuals in social situations. Topics include: methodology, social perception, social cognition, the self, attitudes, prejudice, attraction, social influence, pro-social behavior, aggression, and behavior in groups. Course activities include lecture, class demonstrations, and assignments. (Prerequisites: PSYC-101 or PSYC-101H or completion of one (1) 200 level PSYC course.) **Lecture 3, Credits 3 (Fall, Spring)**

PSYC-226**Developmental Psychology**

This course explores the process of human development, from conception through adolescence and continuing through later adulthood. The developmental approach integrates across many areas of psychology, including perception, cognition, social and emotional development, personality, morality, human factors, and neuroscience. Topics will include such things as infant brain plasticity, the development of identity in adolescence, and memory changes in adulthood. In addition, experimental methods of developmental research will be introduced and practiced, including issues specific to studying children and adults. (Prerequisites: PSYC-101 or PSYC-101H or completion of one (1) 200 level PSYC course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

PSYC-231**Death and Dying**

This course examines the role of loss including death in our lives and the way we give and receive support during difficult times. It also looks at how society enfranchises some grievers and disenfranchises others. Included in this course is an examination of our options as consumers of funeral and burial services, grief counseling and other products and services which can either minimize or abate our grief. Central to the course is an examination of the ethical principles which apply to abortion, euthanasia and suicide and an examination of the ways in which the choices we make may be structured to express our core values. Finally, the course explores how The American way of Death differs from that of other societies and how we might incorporate the wisdom of other cultures into our own practices. (Prerequisites: PSYC-101 or PSYC-101H or completion of one (1) 200 level PSYC course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

PSYC-233**History and Systems in Psychology**

This course explores the history of psychology from ancient to modern times and examines topical and philosophical questions that have persisted. Psychological schools of thought to be covered include pre-modern philosophical influences, Structuralism, Functionalism, Behaviorism, Psychoanalysis, Humanistic Psychology, Cognitive Psychology, Psychological Testing, and Positive Psychology. (Prerequisites: PSYC-101 or PSYC-101H or completion of one (1) 200 level PSYC course.) **Lecture 3, Credits 3 (Fall, Spring)**

PSYC-233H**Honors History and Systems**

This honors course explores the history of psychology from ancient to modern times and examines topical and philosophical questions that have persisted. Psychological schools of thought to be covered include pre-modern philosophical influences, Structuralism, Functionalism, Behaviorism, Psychoanalysis, Humanistic Psychology, Cognitive Psychology, Psychological Testing, and Positive Psychology. (Honors Students) **Lecture 3, Credits 3 (Fall, Spring)**

PSYC-234**Industrial and Organizational Psychology**

Industrial and organizational (I/O) psychology is a branch of applied psychology that is concerned with efficient management of an industrial labor force and especially with problems encountered by workers in a mechanized environment. Specific areas include job analysis, defining and measuring job performance, performance appraisal, tests, employment interviews, employee selection and training, and human factors. This course covers the basic principles of the above areas as well as applications of current research in I/O psychology. (Prerequisites: PSYC-101 or PSYC-101H or completion of one (1) 200 level PSYC course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

PSYC-235**Learning and Behavior**

This course covers topics in learning such as non-associative learning, classical conditioning, instrumental conditioning, stimulus control of behavior, reinforcement, generalization and discrimination, and observational learning. Topics on learning and behavior in non-human animals may also be covered. (Prerequisites: PSYC-101 or PSYC-101H or completion of one (1) 200 level PSYC course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

PSYC-236**Personality**

This course is intended for students who are interested in learning the history and current status of personality theories. Students will learn the strengths and weaknesses of the major personality theories, as well as how to assess, research and apply these theories. As much as possible, application to real life situations will be discussed. (Prerequisites: PSYC-101 or PSYC-101H or completion of one (1) 200 level PSYC course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

PSYC-237**Psychology of Women**

The purpose of this course is to examine the psychology and lives of girls and women. In addition to the influence of culture, biological and genetic differences will be highlighted for each of the different topics. The topics covered include gender stereotypes, the development of gender roles, gender comparisons, love relationships, sexuality, motherhood and violence against women. (Prerequisites: PSYC-101 or PSYC-101H or completion of one (1) 200 level PSYC course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

- PSYC-238** **Psychology of Religion**
 This course examines (primarily social) psychological approaches to religious and spiritual belief, behavior, and experience. Topics include psychological approaches to religion, religious development in children and adolescents, religious development in adults and old age, religious conversion, religious orientation, religious attitudes and behaviors, religion and well-being, group dynamics in religious communities, religion as a total institution, cults and deprogramming, need theories and religion, and religion and politics. (Prerequisite: PSYC-101 or PSYC-101H or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**
- PSYC-239** **Positive Psychology**
 This course will provide a survey of the emerging field of Positive Psychology. Topics covered will include defining and assessing “the good life”; the relationships between life satisfaction and personal factors such as wealth, education, and longevity; cross-cultural perspectives; virtues and strengths; and biological factors (i.e., genetics and neurological correlates). The focus will be on contemporary empirical psychology literature, though the course will also draw on literature from historical, philosophical, and economic disciplines. (Prerequisites: PSYC-101 or PSYC-101H or completion of one (1) 200 level PSYC course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**
- PSYC-240** **Human Sexuality**
 This course provides an overview of human sexuality through the lenses of biology and psychology. What causes sexual behavior and why do some individuals display different sexual behaviors than others? Human sexual physiology, attitudes, beliefs, and behaviors are highly diverse. Coursework will examine the ways in which human sexuality varies among individuals, across groups, and throughout the lifespan. Multiple explanations for sexual behavior will be considered, drawing from evolutionary psychology, learning theory, social psychology, and biology. Atypical and harmful sexual behaviors will be addressed as well. Throughout the course, students will learn how social science research techniques have been used to expand the field of human sexuality and how empirical inquiry can differentiate myths from facts. (Prerequisites: PSYC-101 or PSYC-101H or completion of one (1) 200 level PSYC course.) **Lecture 3, Credits 3 (Spring)**
- PSYC-241** **Health Psychology**
 A majority of serious diseases today are caused by or exacerbated by behavior and many are preventable. This course provides an introduction to the role of behavior in health. Students will learn about the role of psychology in studying and promoting good health behaviors. Topics include the impact of stress and coping on health, psychological variables related to chronic disease, drug addiction, promoting healthy behavior (e.g. exercise, diet, sleep, sexual health), positive psychology, pain management, critical thinking about health product and alternative medicine claims, and research approaches in health psychology. Students who might elect to take this course include students majoring in related fields who wish to learn more about health behavior (e.g. healthcare technology), students majoring, minoring, or immersing in Psychology, and students looking for a Liberal Arts Elective. (Prerequisites: PSYC-101 or PSYC-101H or completion of one (1) 200 level PSYC course.) **Lecture 3, Credits 3 (Fall, Spring)**
- PSYC-242** **Cultural Psychology**
 This course provides an introduction to cultural psychology. Cultural psychology focuses on the ways in which culture influences our mental processes and behavior. According to Wang (2016), “cultural psychology is necessary for the building of a true psychological science” (2016, p. 3). As part of this course, students will learn about the types of research methods and theoretical models required for investigating the impact of culture on our psychology. Cultural psychologists study a number of key research questions including but not limited to how and why cultural groups differ, how cultural groups are similar, the dynamic interaction between culture and individual differences or personality, and the multiple ways in which culture influences cognition and behavior. Critically, cultural psychology emphasizes the value and importance of appreciating diversity and multiculturalism. As one example, cultural psychology incorporates intersectionality by focusing on the combined effect of multiple identities, such as gender and cultural heritage in shaping our psychology. This course will provide an in-depth focus on diversity, multiculturalism, and the value of appreciating the global landscape in which we live. (Prerequisite: PSYC-101 or PSYC-101H or equivalent course.) **Lecture 3, Credits 3 (Biannual)**
- PSYC-250** **Research Methods I**
 This course will serve as an introduction to research methods in psychology, with the goal of understanding research design, analysis and writing. Topics include examining the variety of methods used in psychology research, understanding research ethics, developing empirical hypotheses, designing experiments, understanding statistical concepts, interpreting results, and writing research and review papers in APA style. This is a required course for all psychology majors, and is restricted to students in the psychology program. (Prerequisites: PSYC-101 or PSYC-101H and STAT-145 or STAT-145H equivalent course and student standing in PSYC-BS or HCC-BS programs.) **Lecture 3, Credits 3 (Fall, Spring)**
- PSYC-251** **Research Methods II**
 This course will serve as an advanced research methods course in psychology, and will build on the foundational knowledge presented in Research Methods I. Topics and tasks for this course include designing single and multi-factor experiments, interpreting correlational research, completing statistical analyses appropriate to design, completing and analyzing an IRB application, understanding observational and survey research, and presenting results in APA style. This is a required course for all psychology majors, and is restricted to students in the psychology program. (Prerequisites: PSYC-250 and STAT-146 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**
- PSYC-255** **Behavioral Science Research Methods**
 This course introduces the fundamentals of quantitative and qualitative research methods to equip students to understand and critically assess behavioral science research literature. Students learn about empirically-grounded approaches to knowledge, ethical issues in research, experimental and non-experimental methods, threats to validity and generalizability, general protocols for data-analysis, and standard formats for reporting research. (Pre-requisites: PSYC-101 and (STAT-145 or MATH-251) or equivalent courses.) **Lecture 1, Credits 3 (Fall, Spring)**
- PSYC-300** **Topics in Psychology**
 This course focuses on current issues and subfields in the field of psychology that are not distinctly incorporated in the established Psychology course offerings. This course concentrates on student discussion and interaction related to required readings. Examples of possible topics are forensic psychology, school psychology, neuropsychology, pseudoscience, etc. Part of the Psychology Minor and Immersion. Students may repeat the course but may not repeat the topic. (Prerequisites: Must have completed at least one PSYC course - 200 level or higher.) **Lecture 3, Credits 3 (Annual)**
- PSYC-301** **Junior Seminar in Psychology**
 This professional development course is intended for students in the psychology major to prepare for their careers. Topics include identifying career interests and values, learning how to effectively search for co-ops and jobs, preparing a resume and CV, identifying appropriate graduate programs, preparing graduate school applications, interview skills, and professional communication. Students will use career-planning resources such as the Psychology Career Center on campus and the Psychology Career Center community site on myCourses. This course is required for students majoring in Psychology. (This class is restricted to students with at least 3rd year standing in the PSYC-BS program.) **Lecture 1, Credits 1 (Fall, Spring)**
- PSYC-313** **Forensic Psychology**
 An exploration of the theoretical, methodological, and practical issues associated with forensic psychology. Topics will cover the psychological aspects of the full range of the criminal justice system from policing to incarceration. Specific topics include: criminal profiling, eyewitness memory, jury decisions, and special trial cases (e.g. discrimination, sexual harassment). (Prerequisites: PSYC-101 or PSYC-101H or completion of one (1) 200 level PSYC course.) **Lecture 3, Credits 3 (Annual)**
- PSYC-410** **Psychophysiology**
 This course is intended for students in the biopsychology track. This course provides a comprehensive introduction to psycho-physiology. Students will learn about various psychophysiological measures and their use in the study of areas such as attention, emotion, and language. Topics may include mind-body interaction, somatic and autonomic nervous system function, central and peripheral physiological measures (e.g., EEG, EMG, cardiac reactivity, skin conductance responses), psychophysiological research methods, and applied psychophysiology. Students will be expected to be able to write at an upper level using APA format. Part of the biopsychology track for the psychology degree program. (Prerequisites: (PSYC-222 or 0514-548 or 0514-553) and (PSYC-251 or (0514-315, 0514-350 and 0514-400) or equivalent courses.) **Lecture 3, Credits 3 (Biannual)**
- PSYC-411** **Psychopharmacology**
 This course is intended for students in the biopsychology track. A comprehensive introduction to psychoactive drugs. Topics include pharmacokinetics, pharmacodynamics, synaptic transmission, drugs of abuse and drugs used in the treatment of mental disorders, and the behavioral and cognitive effects of these drugs. Students will be expected to be able to write at an upper level using APA format. (Prerequisites: PSYC-222 and PSYC-250 and STAT-145 or equivalent courses.) **Lecture 3, Credits 3 (Biannual)**
- PSYC-412** **Biological Bases of Mental Disorders**
 This course is intended for students in the biopsychology track. This course covers the biological underpinnings of psychiatric mental disorders such as anxiety disorders, mood disorders, psychotic disorders, and developmental disorders. Topics will include neuroanatomy, neurophysiology, genetics and biologically based treatments of mental disorders. Students will learn about biologically based research methods used to study mental disorders and to think critically about research findings in the field. Students will be expected to be able to write at an upper level using APA format. (Prerequisites: PSYC-222 and PSYC-250 and STAT-145 or equivalent courses.) **Lecture 3, Credits 3 (Biannual)**

PSYC-420**Clinical Psychology**

This course is intended for students in the clinical track. This course is designed to provide a broad overview of the field of clinical psychology, including the way in which it is similar to and different from other mental health disciplines (psychiatry, social work, school psychology). The course will cover the basic foundations of clinical psychology, training models and graduate programs, clinical assessment, clinical interventions, and subspecialties in clinical psychology (e.g., neuropsychology, child clinical). (Prerequisites: PSYC-221 and (PSYC-250 or 0514-315, 0514-350 and 0514-400) and STAT-145 or equivalent courses and student standing in the PSYC-BS program.) **Lecture 3, Credits 3 (Biannual)**

PSYC-421**Psychological Testing**

This course is intended for students in the clinical track. This course is intended for students in the psychology major to develop knowledge of psychological testing theory, methods, and applications. Students will first learn about the history of psychological testing, types of tests, and uses of tests. Students will learn about test development and standardization procedures including item construction, sampling, norms, reliability, validity, administration procedures, and scoring. A brief review of relevant statistical concepts will be provided. Students will learn how to locate and evaluate available psychological tests. Examples of psychological tests from various areas of application will be reviewed and critiqued. (Prerequisites: PSYC-221 and (PSYC-250 or 0514-315, 0514-350 and 0514-400) and STAT-145 or equivalent courses.) **Lecture 3, Credits 3 (Biannual)**

PSYC-422**Psychotherapy**

This course is intended for students in the clinical track. Students will learn the strengths and weaknesses of the major therapeutic approaches. They will learn the efficacy of these approaches. They will learn the theoretical and research bases for the approaches. As much as possible, application to real life situations will be discussed. Part of the clinical track for the psychology degree program. (Prerequisites: PSYC-221 and (PSYC-250 or 0514-315, 0514-350 and 0514-400) and STAT-145 or equivalent courses.) **Lecture 3, Credits 3 (Biannual)**

PSYC-430**Memory and Attention**

This course is intended for students in the cognitive track. This course reviews current research in the areas of memory and attention. This course will consider such memory topics as: classic theories of memory, Baddeley's model of working memory, information processing, implicit and explicit memory, principles of forgetting, developmental changes in memory, skill memory, autobiographical memory, eyewitness memory, and the neural bases of memory. Attention topics covered in this course will include: Selective and divided attention, search and vigilance, signal detection theory, and neural correlates of attention. (Prerequisites: PSYC-223 and (PSYC-251 or 0514-315, 0514-350 and 0514-400) or equivalent courses.) **Lecture 3, Credits 3 (Biannual)**

PSYC-431**Language and Thought**

This course is intended for students in the cognitive track. This course examines the structure of human language and its relationship to thought, and surveys contemporary theory and research on the comprehension and production of spoken and written language. In addition, we will discuss categorization, representation of knowledge, expertise, consciousness, intelligence, and artificial intelligence. Topics on language and thought in non-human animals may also be covered. Part of the cognitive track for the psychology degree program. (Prerequisites: PSYC-223 and (PSYC-251 or 0514-315, 0514-350 and 0514-400) or equivalent courses.) **Lecture 3, Credits 3 (Biannual)**

PSYC-432**Decision Making, Judgment, and Problem Solving**

This course is intended for students in the cognitive track. This course explores judgment, decision-making and problem-solving processes and focuses on the social and cognitive aspects of complex information processing. Major topics include normative, descriptive (heuristics and biases), and naturalistic approaches to decision-making, as well as selective perception, memory and hindsight biases, framing effects, social influences, group processes and human error. Models of decision-making considered include the prospect theory, expected utility theory, and Bayes' Theorem. Problem solving will be examined from perspectives of formal, computational methods as well as intuition and creativity. Experimental methods and applications in design of systems and decision aids will receive special attention. (Prerequisites: PSYC-223 and (PSYC-251 or 0514-315, 0514-350 and 0514-400) or equivalent courses.) **Lecture 3, Credits 3 (Biannual)**

PSYC-440**Interpersonal Relationships**

This course is intended for students in the social track. This course explores topics related to interpersonal relationships including: methodology, communication in relationships, romantic relationships, friendships, work relationships, as well as individual differences that can influence the development, maintenance, and cessation of relationships. Course activities include lecture, class discussions, and assignments. (Prerequisites: PSYC-225 and PSYC-250 and STAT-145 or equivalent courses.) **Lecture 3, Credits 3 (Biannual)**

PSYC-441**Group Processes**

This course is intended for students in the social track. This course explores social psychological phenomena at the level of the group. It explores intragroup processes such as cohesion, norms, network structure, social influence, task productivity, group decision making and polarization. It also explores intergroup processes, especially those related to intergroup conflict and cooperation, such as social categorization, social identity, and stereotyping. (Prerequisites: PSYC-225 and PSYC-250 and STAT-145 or equivalent courses.) **Lecture 3, Credits 3 (Biannual)**

PSYC-442**Attitudes and Social Cognition**

This course is intended for students in the social track. This course explores social psychological phenomena at the level of the individual. This course addresses those domains of social behavior in which cognition plays a major role, including the interface of cognition with overt behavior, affect, and motivation. Among topics covered are the formation, change, and utilization of attitudes, attributions, and stereotypes, person memory, self-regulation, and the origins and consequences of moods and emotions insofar as these interact with cognition. This course also explores the influence of cognition on significant social phenomena such as persuasion, communication, prejudice, social development, and cultural trends. Part of the social track for the psychology degree program. (Prerequisites: PSYC-225 and PSYC-250 and STAT-145 or equivalent courses.) **Lecture 3, Credits 3 (Biannual)**

PSYC-450**Visual System and Psychophysics**

This course is intended for students in the visual perception track. The course focuses on visual perception and the methods used for studying sensation and perception. Structures in the human and other visual systems will be examined along with neurophysiology relevant to vision in particular and perception in general. Classical psychophysics, forced choice methods, staircases and other specialized techniques will be examined. Students will collect and analyze psychophysical data to demonstrate their understanding of the methods and their application in vision science. Part of the visual perception track for the psychology degree program. (Prerequisites: PSYC-224 and (PSYC-250 or 0514-315, 0514-350 and 0514-400) and STAT-145 or equivalent courses.) **Lecture 3, Credits 3 (Biannual)**

PSYC-451**Color, Form and Object Perception**

This course is intended for students in the visual perception track. The course focuses on the perception of the surface properties of objects, including color, form and other attributes. The course will examine how information is encoded by the visual system, with an emphasis on recognizing objects in scenes and surfaces. Receptive field properties, parallel processing in vision, the binding problem and other issues in vision science will be presented and discussed. The course requires students to read primary sources and to gain some experience with the design of experiments. Empirical research in vision will be conducted including data collection and analysis. Students are recommended to take PSYC-350 Visual System and Psychophysics before this course, but it is not required. (Prerequisites: PSYC-224 and (PSYC-250 or 0514-315, 0514-350 and 0514-400) and STAT-145 or equivalent courses.) **Lecture 3, Credits 3 (Biannual)**

PSYC-452**Depth, Motion and Space Perception**

This course is intended for students in the visual perception track. The course focuses on the perception of the three-dimensional space, including the perception of depth and motion. This course will examine how sensory data are used to produce an accurate representation of the world. This course will include some discussion of multimodal perception given the interactions that occur between audition, touch, and vision to produce a 3D representation. Topics will include receptive field properties in relevant areas of cortex, parallel processing in vision, the uncertainty of extracting accurate 3D properties from 2D input and related material. The course requires students to read primary sources and to gain some experience with the design of experiments. Empirical research in vision will be conducted including data collection and analysis. Students are recommended to take PSYC-350-Visual System and Psychophysics before this course, but it is not required. (Prerequisites: PSYC-224 and (PSYC-250 or 0514-315, 0514-350 and 0514-400) and STAT-145 or equivalent courses.) **Lecture 3, Credits 3 (Biannual)**

PSYC-460**Developmental Psychopathology**

This course examines the ways in which people deviate from typical development throughout the lifespan. The specific course content will vary depending on the expertise of the instructor, but might include topics like developmental disabilities, disorders of aging, disruptive behavior disorders, or the effects of maltreatment on development. This course is part of the developmental track for psychology majors. (Prerequisites: PSYC-232/226 and PSYC-251 and STAT-145 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

PSYC-461**Social and Emotional Development**

This course takes an in-depth look at some of the normative processes of human social and emotional development. The specific course content will vary depending on the expertise of the instructor, but might include topics like parenting and family relationships, social development and peer relationships, or adolescent social and emotional development. This course is part of the Developmental Track for psychology majors. (Prerequisites: PSYC-232/226 and PSYC-251 and STAT-145 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

PSYC-462 Cognitive and Perceptual Development
 This course takes an in-depth look at the processes of perception and cognition as they develop over the lifespan. Drawing on basic research and theory, we will use a developmental perspective to study changes in perception and cognition. The specific course content will vary depending on the expertise of the instructor, but might include topics like sensory awareness, perceptual learning, object representation, causality, language, theory of mind, memory, or problem solving. This course is part of the Developmental Track for psychology majors. (Prerequisites: PSYC-232/226 and PSYC-251 and STAT-145 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

PSYC-498 Psychology Internship
 Internship in Psychology. This is for 350 hours of supervised unpaid work off campus with non-profits, public service groups, the zoo, or similar organizations. Each Internship experience must be approved by the department of psychology prior to starting. (This course is restricted to PSYC-BS Major students.) **Internship, Credits 0 (Fall, Spring, Summer)**

PSYC-499 Psychology Co-op
 Psychology Co-op (This course is restricted to PSYC-BS Major students.) **CO OP, Credits 0 (Fall, Spring, Summer)**

PSYC-501 Senior Capstone Proposal
 This course is intended for students in the psychology major to develop experimental research expertise and put into practice some of what is learned in Research Methods I and II. Students will explore topics of interest for further research in psychology. They will develop one research idea that could either form the basis for a senior project in psychology or is a valid test of a research idea. Students will be supervised by the course instructor as they develop a research question, conduct a literature review, write the introduction, and examine questions about control, validity and reliability. This course will culminate in a research proposal. Students going on to Senior Project in Psychology can use this as a proposal course and must find their faculty adviser for senior project before they finish this course. Students who are not planning for Senior Project will practice writing a proposal and the related skills required to critically examine an advanced topic in Psychology. (Prerequisites: PSYC-251 and STAT-146 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

PSYC-502 Seminar in Psychology
 This course is intended for students in the psychology major to integrate material covered in earlier courses and examine broad topics in Psychology. The specific topics covered will vary from semester to semester. This course is an opportunity for faculty and students to examine issues that transcend sub-disciplines in psychology. Students will read original research and examine influential theories relevant to the topic. (Prerequisites: PSYC-251 or (0514-315, 0514-350 and 0514-400) or equivalent course. Co-requisites: One (1) 300-level psychology (PSYC) class or one (1) 500-level psychology (0514) class.) **Lecture 3, Credits 3 (Fall, Spring)**

PSYC-510 Senior Project in Psychology
 This course is intended for students in the psychology major to demonstrate experimental research expertise, while being guided by faculty advisors. The topic to be studied is up to the student, who must find a faculty advisor before signing up for the course. Students will be supervised by the advisor as they conduct their literature review, develop the research question or hypothesis, develop the study methodology and materials, construct all necessary IRB materials, run subjects, and analyze the results of their study. This course will culminate in an APA style paper and poster presentation reporting the results of the research. Because Senior Project is the culmination of a student's scientific research learning experience in the psychology major, it is expected that the project will be somewhat novel, will extend the theoretical understanding of their previous work (or of the previous work of another researcher), and go well beyond any similar projects that they might have done in any of their previous courses. (Prerequisites: PSYC-501 or equivalent course.) **Research, Credits 3 (Fall, Spring)**

PSYC-550 Undergraduate Research Experience
 Practicum open to psychology students. Gives the student first-hand experience in the field of psychology working on research that matches the student's career objectives. Students are closely supervised by a faculty member, developing relevant skills and learning how to do research first-hand. May count for the equivalent of the psychology co-op experience with prior approval and sufficient time commitment. (3rd or 4th year status). Prerequisites PSYC-101, -250, -251. Credit 0 (F, S, Su) (Prerequisites: PSYC-101, PSYC-250 and PSYC-251 or equivalent courses and minimum of 3rd year standing in PSYC-BS.) **Research, Credits 0 (Fall, Spring, Summer)**

PSYC-599 Independent Study
 A program of study executed by an individual student with assistance and guidance by an instructor, outside a regular classroom setting. Guidelines for designing and gaining approval for an independent study are provided in College of Liberal Arts Policy I.D. **Ind Study, Credits 1 - 6 (Fall, Spring, Summer)**

Public Policy

PUBL-101 Foundations of Public Policy
 This interdisciplinary course introduces the student to the key concepts of public policy, the policymaking process, the role of stakeholders and interest groups, and the basic dimensions policy analysis. Those concepts are then applied through a range of issues, such as the environment, clean energy, climate change, healthcare, cybersecurity, employment, privacy, telecommunications, and innovation, at local, state, federal and international levels. **Lecture 3, Credits 3 (Fall)**

PUBL-120 Contemporary Issues in Public Policy
 This course provides students the understanding of the concepts of public policy formation and implementation, the role of citizens, other stakeholders, and interest groups. Students will engage in analysis of a wide array of contemporary socio-economic issues, through structured writing assignments and class presentations. The course content is structured to provide students with the skills to increase their writing proficiency, and the opportunities to publicly communicate and defend their ideas. **Lecture 3, Credits 3 (Fall)**

PUBL-201 Ethics, Values and Public Policy
 This course focuses on the connections and interplay between personal and social values, ethics, and public policy. It explores how values and norms influence public policies and how the resulting expressions of values through public policies impact the implementation and effectiveness of policy choices. It also delves into how different countries make widely different policy choices based on their citizens' values and social norms. The course also considers how new developments in science and technology influence the interplay between values, ethics, and policy across multiple issues. In addition, this course explores how to formulate values-based explanations of certain public policy preferences. Topics range across the policy issue spectrum. **Lecture 3, Credits 3 (Fall)**

PUBL-210 Introduction to Qualitative Policy Analysis
 This course teaches the practical aspects of doing theoretically informed qualitative social research with policy applications. Special attention is given to the processes by which research problems are formulated, research designs selected, data gathered and interpreted, and inferences and conclusions drawn. A variety of tools, such as surveys, interviewing, and content analysis will be applied to specific case studies covering multiple policy issues. **Lecture 3, Credits 3 (Spring)**

PUBL-301 Public Policy Analysis
 This course provides students with necessary tools to help them become effective policy analysts. The course places particular emphasis on understanding the policy process, the different approaches to policy analysis, and the application of quantitative methods, such as cost-benefit analysis, sampling designs, and decision trees. Students will apply these tools to contemporary public policy decision making at the local, state, federal, and international levels. (Prerequisites: This class is restricted to students with at least 2nd year standing.) **Lecture 3, Credits 3 (Spring)**

PUBL-302 Decision Analysis
 This course provides students with an introduction to decision science and analysis. The course focuses on several important tools for making good decisions, including forecasting, risk analysis, and multi-attribute decision making. Students will apply these tools to contemporary public policy decision making at the local, state, federal, and international levels. (Prerequisites: This class is restricted to students with at least 2nd year standing.) **Lecture 3, Credits 3 (Spring)**

PUBL-363 Cyber Security Policy and Law
 Why are we still so bad at protecting computer systems? Is it because we don't have good enough technology? Or because we lack sufficient economic incentives to implement that technology? Or because we implement technologies but then fail to use them correctly? Or because the laws governing computer security are so outdated? Or because our legal frameworks are ill-equipped to deal with an international threat landscape? All these reasons—and others—have been offered to explain why we seem to see more and more large-scale cybersecurity incidents and show no signs of getting better at preventing them. This course will examine the non-technical dimensions of this problem—the laws and other policy measures that govern computer security threats and incidents. We will focus primarily on U.S. policy but will also discuss relevant policies in the E.U. and China, as well as international tensions and norms. The central themes of the course will be the ways in which technical challenges in security can be influenced by the social, political, economic, and legal landscapes, and what it means to protect against cybersecurity threats not just by writing better code but also by writing better policies and laws. **Lecture 3, Credits 3 (Fall, Spring)**

PUBL-450 Field Experience
 This course gives the student first-hand experience in the field of public policy in an appropriate organization that meets the needs of the student's career objectives. Students are supervised at selected organizations, developing their pre-professional skills while learning the organization's programs and methods. (Prerequisites: This class is restricted to PUBPOL-BS Major students with at least 2nd year standing.) **Internship, Credits 1 - 15 (Fall, Spring, Summer)**

PUBL-499**Public Policy Co-Op**

One semester of paid work experience in a professional setting related to the communication major. (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Fall, Summer)**

PUBL-500**Senior Project**

This project-based course represents the culminating educational experience for public policy degree students. In the course, students work to identify and analyze a real-world policy-related problem at the local, state, federal, or international level. Typically, projects are informed by, and delivered to, outside stakeholders or clients who work with the students to help formulate, structure, and/or carry out the project. Students work in a team environment under the guidance of a faculty adviser. Under special circumstances students may work individually with the approval of the program. (Enrollment in this course requires permission from the department offering the course.) **Research 6, Credits 3 (Fall, Spring)**

PUBL-510**Technological Innovation and Public Policy**

Technological innovation, the incremental and revolutionary improvements in technology, has been a major driver in economic, social, military, and political change. This course will introduce generic models of innovation that span multiple sectors including: energy, environment, health, and bio- and information-technologies. The course also analyzes how governments choose policies, such as patents, to spur and shape innovation and its impacts on the economy and society. Students will be introduced to a global perspective on innovation policy including economic competitiveness, technology transfer and appropriate technology. **Lecture 3, Credits 3 (Spring)**

PUBL-520**Information and Communications Policy**

This course examines how federal and international policies are developed to influence innovation in, and regulation of, information, computer, and telecommunications technologies. In particular the course will examine such topics as privacy, freedom of speech, cyber security, copyrights and intellectual property rights, access to information technology, and the regulation of the Internet. **Lecture 3, Credits 3 (Fall)**

PUBL-530**Energy Policy**

This course provides an overview of energy resources, technologies, and policies designed to ensure clean, stable supplies of energy for the future. The course evaluates the impacts of fossil fuel, renewable energy, and hydrogen technologies on society and how public policies can be used to influence their development. The development of U.S. energy policy is of particular concern, although a global perspective will be integrated throughout the course. **Lecture 3, Credits 3 (Spring)**

PUBL-531**Climate Change: Science, Technology and Policy**

This multidisciplinary course will provide students with diverse perspectives on global climate change issues, providing a survey of important aspects of the problem. Topics include atmospheric chemistry, climate modeling, ecological impacts and feedbacks, economics of climate change, international climate policies, and social and environmental justice. The course will include a variety of instructors and guest lecturers, providing an overview of the complex and inter-related nature of global climate change. (This class is restricted to undergraduate students with at least 3rd year standing.) **Lecture 3, Credits 3 (Spring)**

PUBL-589**Topics in Public Policy**

Allows examination of a special problem or topical area in the field of public policy. Topics and specific content and methods vary from year to year or term to term. **Lecture 3, Credits 1 - 4 (Fall, Spring)**

Science, Technology and Society

STSO-120**Introduction to Environmental Studies**

This course explores the human condition within an environmental context by emphasizing critical environmental problems facing humans on both a global and regional scale. The approach will be interdisciplinary. The issues, their causes, and their potential solutions will be analyzed with respect to ethical, social, historical, political, scientific, and technological factors. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

STSO-140**Science, Technology, and Values**

This course explores the concepts and effects of science and technology on society, analyzes the relationship between science and technology, examines how each has come to play a major role today, and looks at how science and technology have affected and been affected by our values. This course also considers the environmental aspects of science and technology. Science and technology are often assumed to be value free, yet people, guided by individual and societal values, develop the science and technology. In turn, the choices people make among the opportunities provided by science and technology are guided by their individual values. **Lecture 3, Credits 3 (Fall, Spring)**

STSO-201**Science and Technology Policy**

Examines how local, state, federal and international policies are developed to influence innovation, the transfer of technology and industrial productivity in the United States and other selected nations. **Lecture 3, Credits 3 (Fall, Spring)**

STSO-220**Environment and Society**

This course introduces the interdisciplinary foundations of environmental science via an analysis of sustainability within a socio-cultural context. This is a required course for the environmental science degree program. **Lecture 3, Credits 3 (Fall)**

STSO-230**Foundations of Engagement and Community Transformation**

Are you passionate about addressing the socially-complex, wicked problems of our time? This interdisciplinary, active-learning course will lay the groundwork for students who want to participate in future place-based community-engaged research, development or design projects that build on community strengths and address community determined challenges. Through literature reviews, discussions, cases study analysis, role plays, debates, reflective writing, and visits with experienced community practitioners, we will explore the larger context of the systems within which we live and how others have engaged in efforts to improve community wellbeing both locally and globally. We will strive for a more nuanced understanding of our world and its power dynamics from various perspectives. We will investigate the context in which community and economic development has traditionally occurred, how technology has been involved, and the effects of projects and activities on the "beneficiaries". We will investigate best practices including mindsets, worldviews, skills, processes, and tools for community-driven positive change. Finally we will use all our learnings to develop our own evaluation framework and apply it to a current community project. This course incorporates humanities and social science approaches and counts for general education requirements. **Lecture 3, Credits 3 (Spring)**

STSO-240**Social Consequences of Technology**

Modern society is increasingly based on technology. With each advance due to technology, unanticipated problems are also introduced. Society must define and solve these problems or the advances may be diluted or lost. In this course we study several interactions between technology and the world in which we live. We investigate how various technologies developed and compare the expected effects of the new technologies with the actual results. **Lecture 3, Credits 3 (Fall, Spring)**

STSO-246**History of Women in Science and Engineering**

Using biographical and social-historical approaches, this course examines the history of women's involvement in science and engineering since the birth of modern science in the seventeenth century; the historical roots of gender bias in the Western scientific enterprise; and the influx of women into science and engineering since the mid-to-late 20th century. Cross-listed with women's and gender studies. **Lecture 3, Credits 3 (Spring)**

STSO-321**Face of the Land**

Based on field trips and critical readings, this course explores how the land around us has been shaped and reshaped through a variety of geological forces and historical developments. By considering the natural landforms of the United States (and other countries, as appropriate), students see how the nature of land has determined its value. As technological innovations occur, old relationships with the land have been altered. Thus the course offers students a historical approach to the relationship of technology and society, as evidence by the landscape. The seminar format for this course will also advance students' writing, speaking, and research skills. **Lecture 3, Credits 3 (Spring)**

STSO-325**History of the Environmental Sciences**

This course surveys the history of the environmental sciences from antiquity to the present. The environmental sciences include those sciences that deal with the Earth's physical and organic environments, ranging from geology and biology to evolutionary theory and ecology. A prominent theme is the influence of social, religious, and political ideas on theories of how the Earth and its plants and animals have evolved. **Lecture 3, Credits 3 (Biannual)**

STSO-326**History of Ecology and Environmentalism**

This course explores the history of ecological science, from the eighteenth century to the present, and it features the political use of ecological ideas in environmental debates, from the 19th century to the present. We investigate how social and political ideas have influenced ecological science, how ecological concepts have influenced Western politics and society, and how different generations of ecological researchers have viewed their role in society. **Lecture 3, Credits 3 (Fall)**

STSO-330**Energy and the Environment**

This course will examine contemporary energy issues, with particular emphasis placed on the environmental implications associated with energy consumption and production. Students will learn about various energy technologies and fuels (including nuclear, coal, oil, natural gas, solar, biomass, and wind) and the environmental tradeoffs associated with each of these energy systems. **Lecture 3, Credits 3 (Fall)**

STSO-335 Industry, Environment, and Community in Rochester
 This course examines Rochester through the lens of industrialization, immigration, technological innovation, and environmental change between the 1890s and 1990s. This class blends readings and discussion with experiential learning and community-based research projects to help students understand community identity as a result of changes in livelihoods, immigration, and environment. Students will examine these social changes in both a local and global context. Students will have a better appreciation for the way historical forces shape a contemporary sense of place. **Lecture 3, Credits 3 (Spring)**

STSO-340 Technological Disasters
 Disasters represent a disruption to daily life, with technological disasters defined as disasters resulting from human-made causes, where failures in modern technology create both acute and ongoing dangers for communities. This course focuses on how human technological advances can have adverse impacts on the communities those innovations are meant to improve. Through an investigation of technological systems and case-specific technologies, combined with ecological, social, and political systems, the causes, consequences, and long-term implications of technological disasters are considered. The course will examine cases that range from the actual to the anticipated, such as the New Orleans levee failures, Flint water crisis, Dalkon shield contraception, large-scale networked hacks, CRISPR-created and/or naturally-occurring superviruses, voting poll technology failures, and AI, in the context of the societal systems of modern industrial capitalism. Special attention will be paid to aspects of social vulnerability which make the impacts of technological disasters different for various sub-populations within their respective communities. **Lecture 3, Credits 3 (Biannual)**

STSO-341 Biomedical Issues: Science and Technology
 A study of the impact of science and technology on life, our view of life and of the value issues that arise from this impact. **Lecture 3, Credits 3 (Biannual)**

STSO-342 Gender, Science, and Technology
 This course explores the importance of gender within Western science and technology. It considers how masculine and feminine identities are socially and culturally shaped, how sex and gender are being significantly transformed, and how rethinking gendered practices may help make science and technology fairer and more responsive. Cross-listed with women's and gender studies. **Lecture 3, Credits 3 (Fall)**

STSO-345 Makers of Modern Science
 Approaches the history of science through studying biographies of modern scientists. Modern science is understood to be science from the Scientific Revolution of the 16th and 17th centuries to the present. Emphasis will be on recent scholarship devoted to analyzing science in context, i.e., the way it actually develops through the lives of individuals, in particular social and political contexts. **Lecture 3, Credits 3 (Biannual)**

STSO-346 Technology in American History
 This course explores the development of technology in American history, from the time of first contact between Europeans and Native Americans to the present. It emphasizes, for different periods in American history: the technological contributions of individuals or distinctive groups, the main features of important technological systems, and the way technology shaped—and was shaped by—the social, economic, and political institutions of the time. **Lecture 3, Credits 3 (Fall)**

STSO-421 Environmental Policy
 This course introduces students to federal, state, and local environmental policies and the various policy paths leading to their establishment. Students will understand how societal values inform the content of environmental policies and the impacts, in turn, of these policies on society. In addition, the class will explore how environmental economics informs the new tools of environmental policy. The course covers a range of environmental policies at the U.S. and international levels addressing problems such as air and water pollution, climate change, energy use, and community sustainability. **Lecture 3, Credits 3 (Spring)**

STSO-422 Great Lakes
 This course utilizes the Great Lakes Basin as an integrating context for understanding global environmental issues. Examining the basin through an interdisciplinary environmental lens the class applies social science approaches to environmental problem solving. Students assess the local, regional, national and international scope of Great Lakes environmental issues through lecture, role-play, and field experiences and consider the importance of government action, public policy, ethics, economics, sociology, history, and engineering while applying social science analysis skills such as surveys, interviews, and content analysis to better understand the depth of local environmental problems and their potential solutions. Environmental science majors prepare a proposal for an environmental consulting project. **Lecture 3, Credits 3 (Fall)**

STSO-425 Nature and Quantification
 In this course, students will examine the ways in which “nature,” broadly conceived, has been quantified, standardized, and in many cases commodified in the modern West – often in the context of the natural sciences, government bureaucracies, capitalist markets, or some combination of the three. Reading and discussing broadly across history, science studies, anthropology, philosophy, and ecology, students will gain multidisciplinary perspectives on modern informational thinking, and develop analytical tools for assessing contemporary issues related to the quantified environment. **Lecture 3, Credits 3 (Biannual)**

STSO-441 Cyborg Theory: (Re)thinking the Human Experience in the 21st Century
 The developing cybernetic organism or cyborg challenges traditional concepts of what it means to be human. Today medical science and science fiction appear to merge in ways unimaginable a century ago. By exploring scientific and cultural theories, science fiction, and public experience, this class examines the history and potential of the cyborg in Western cultures. **Lecture 3, Credits 3 (Spring)**

STSO-442 Science, Technology, and Society Classics
 STS classics are books that involve science or technology and that also have notable social significance. In this course students will read several such books to advance their understanding of how society learns about, explores, and evaluates science and technology. The seminar format for this course will also advance students' writing, speaking, and research skills. **Lecture 3, Credits 3 (Fall)**

STSO-445 The Natural Sciences in Western History
 This course explores the development of the natural sciences in Western history, from ancient times to the present. It emphasizes how astronomy, physics, chemistry, and biology have changed over time, and it seeks to place those changes in their social, economic, cultural, and religious contexts. **Lecture 3, Credits 3 (Spring)**

STSO-488 Topics in Environmental Studies
 This course will focus on a special problem or topical area in the field of Environmental Studies. Topics and specific content and methods vary from year to year or Semester to Semester. This course may count for minors and immersions with the permission of the Department. The STS Department Chair and individual instructors may be contacted for details. **Lecture 3, Credits 1 - 6 (Annual)**

STSO-489 Topics in Science, Technology, and Society
 This course will focus on a special problem or topical area in the field of STS. Topics and specific content and methods vary from year to year or Semester to Semester. This course may count for minors and immersions with the permission of the Department. The STS Department Chair and individual instructors may be contacted for details. **Lecture 3, Credits 1 - 6 (Fall, Summer)**

STSO-510 Interdisciplinary Capstone Seminar
 This course is an upper-level undergraduate seminar that explores how science, technology, society, environment and policy are understood in contemporary and historical contexts. The course brings together a variety of views and readings to offer an interdisciplinary approach to understanding the complex ways in which citizens make and understand the world. (Enrollment in Department of STS/Public Policy) **Lecture 3, Credits 3 (Fall, Spring)**

STSO-521 Biodiversity and Society
 This course explores the problems, issues, and values stemming from the current massive loss of biodiversity. Various justifications for preserving or conserving biodiversity will be examined. Although principals of conservation biology are presented, the social/cultural dimensions of the issue will be emphasized. **Lecture 3, Credits 3 (Spring)**

STSO-550 Sustainable Communities
 The concept of sustainability has driven many national and international policies. More recently, we have become aware that unless we physical build and rebuild our communities in ways that contribute to sustainability, making progress toward that goal is unlikely. It is equally important to recognize the social aspects of sustainability. In addition, it is at the local level that the goals of equity (a key consideration in community sustainability), most often achieved through citizen participation and collaborative processes are most easily realized. This course will broaden students understanding of the concept of sustainability, particularly the concept of social sustainability. This course focuses on sustainability as a way to bring light to the connections between natural and human communities, between nature and culture, and among environmental, economic, and social systems. Working closely with local organizations, students will explore the applicability of theoretical concepts. **Lecture 3, Credits 3 (Fall)**

Sociology

SOCI-102

Foundations of Sociology

Sociology is the study of the social world and socialization processes. Sociologists study the broader picture of how societies are structured and organized through a macro-sociological analysis as well as how individuals create their own social reality symbolically through their interactions with others in a micro-sociological analysis. Students in this course will learn the fundamentals of each approach and come away with a sociological framework which they can critically apply to their own lives. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

SOCI-102H

Honors Sociology

This course explores how sociological concepts, theories and research account for such social phenomena as socialization, deviance, social structure, stratification, political and religious affiliation and social change. It will also explore how social factors account for political and economic behavior and the speed and spread of technological change. **Lecture 3, Credits 3 (Fall, Spring)**

SOCI-200

On the Cutting Edge: Research and Theory in the 21st Century

Research is the primary pathway to theory formation in the social sciences. This course focuses on how ideas about social life emerge through research in sociology and anthropology. This course is designed as a seminar, in which students discover how scholars in these disciplines formulate research questions in relationship to theory and issues of public concern. (Prerequisites: Successful completion of one course in Anthropology (ANTH), Sociology (SOCL) or International and Global Studies (INGS) is required.) **Lec/Lab 3, Credits 3**

SOCI-210

Black America—Culture and HipHop

This course examines the historical and contemporary conditions of Blacks in the U.S. We will explore African American culture as it is perceived by many African-Americans, and consider theoretical concepts related to immigration and the segmented assimilation of Black immigrant groups coming into the U.S. We will also address identity politics as it relates to race, class, and gender, oppression, as well as the art products that originate in Black communities. A particular emphasis will be placed on Hip Hop music, dance, and style as an expression of Black culture, identity, activism, and social influence (both nationally and globally). **Lecture 3, Credits 3 (Fall, Spring)**

SOCI-215

The Changing Family

Families are the microcosm of society. Sociological concepts and theories define the family as a fundamental institution that both mirrors and propels societal change. The field of family studies explores various parameters of family systems, including gender, race, class, ethnicity, sexuality, division of labor, marriage and divorce, children, and generational relations. In the wake of significant changes in family forms, experiences, and prevailing household arrangements, the scope of sociological inquiry has expanded to meet the new realities of American family life. **Lecture 3, Credits 3 (Fall or Spring)**

SOCI-220

Minority Group Relations

The course will provide a context in which to examine the multiple and contradictory social relations of domination, subordination, resistance, and empowerment. The kinds of questions we will explore focus on how power, knowledge, meaning, and cultural representation are organized. We will analyze a variety of political and ideological themes which bear upon the formation of minority group relations, their identity and how these themes complicate the processes by which people construct their understanding of the nation, world, of others, and themselves. Through reflection on theoretical texts and fictional works, as well as film and other popular media, we will consider for ourselves how culture is differently represented and signified, and how the politics of understanding and misunderstanding minority relations work through practices within and outside cultural institutions. **Lecture 3, Credits 3 (Fa/sp/su)**

SOCI-225

Social Inequality

This course examines various forms of social inequality, including economic, political, health, higher education, race and sex inequality. It uses a variety of sociology's ideas to explain why these kinds of inequality exist, how they persist and what can be done about them. **Lecture 3, Credits 3 (Spring)**

SOCI-230

Sociology of Work

This course analyzes and assesses social relations of paid labor. Sociology's major ideas about the ways we work will be examined and applied to numerous important topics such as: workplace organization, unions, labor legislation, health and safety, workplace culture, interplays between work and family, experiences of work as alienating or satisfying, inequalities at work, and social mobility. **Lecture 3, Credits 3 (Fall or Spring)**

SOCI-235

Women, Work, and Culture

In this course, we analyze historical and contemporary patterns of gender, race/ethnicity, sexuality, and the organization of work. Using the theoretical perspectives we analyze the work historically undertaken by women in societies and its relationship to broader political and economic structures. While our primary focus is on the U.S., we will also conduct a cross-cultural analysis of gender and work in developing and industrializing societies. Specific issues include gender discrimination (e.g., wage discrimination, sexual harassment), sexuality, reproduction, and women organizing to control their work and working conditions. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

SOCI-240

Deaf Culture in America

This course is an introductory survey of Deaf culture in the United States. Students will study the scholarly literature pertaining to various social groups in the Deaf community and have contact with their members. This course will familiarize students with the characteristics of Deaf Culture, as well as general perceptions of the Deaf community within the dominant mainstream society. **Lecture 3, Credits 3 (Fall, Spring)**

SOCI-246

Gender and Health

This course examines connections between gender and health that are both conceptual and empirical. Students will explore the causes of gender-based differences in health outcomes through case studies of sexual and reproductive rights, HIV/AIDS epidemics and violence. Students will also examine global gender and health trends. The course concludes with an examination of gender inequity in health care and policy implications of these inequities. **Lecture 3, Credits 3 (Annual)**

SOCI-295

Global Public Health

Global health is a term that reflects a complex series of problems, policies, institutions and aspirations that have only recently made their way to the global stage. From its earliest days, global health was guided by principles in public health that situate the nation-state as responsible for the health of its population. While international health and tropical medicine, the precursors to global health, was driven by the distinction between wealthy and poor nations, global health today, as this course explores, is oriented to the unequal burden of disease around the world. The course will consider major global health challenges, programs, and policies through an integrated social science lens. After placing global health in historical context, we will focus on how the science of disease cannot be dissociated from the social context and policies that both drive the emergence of disease(s) and respond to the unequal burden of disease around the world. We will analyze current and emerging global health priorities, including emerging infectious diseases, poverty, conflicts and emergencies, health inequity, health systems reforms, and major global initiatives for disease prevention and health promotion. **Lecture 3, Credits 3 (Annual)**

SOCI-300

Sociology of American Life

This course will examine major U.S. institutions and dominant values that pattern everyday life. It will focus on the nation's multi-national corporations, mass media, lawmaking, schools and the military, and dominant ideologies and values that guide these institutions such as the American dream, individualism, competition, faith in technology, consumerism and democracy. Alternative organizations and countercultures will be studied. The course will examine the interconnections between the U.S. and other nations as expressed by such issues as international trade agreements, cultural diffusion, environmental degradation, and war. **Lecture 3, Credits 3 (Biannual)**

SOCI-301

Social and Cultural Theory

This course explores influential classical and contemporary theories regarding society and culture. Students will assess the utility of different theories in addressing key enduring questions regarding human behavior, the organization of society, the nature of culture, the relationship between the individual and society, social control and social conflict, social groups and social hierarchy, the operation of power, cultural and social change, and the interplay between the global and the local. Theories will be marshaled to shed light on contemporary social and cultural phenomena and problems such as crime, violence, exploitation, modernity, and globalization. (Prerequisites: Successful completion of one course in Anthropology (ANTH), Sociology (SOCL) or International and Global Studies (INGS) is required.) **Lecture 3, Credits 3**

SOCI-302

Qualitative Research

Learning about social and cultural groups is a complex and ethically sensitive process. We explore common qualitative research methods for social and cultural research. We evaluate the utility of such methods for different purposes and contexts, including cross-cultural contexts. We consider common ethical dilemmas in research with human subjects, the ethical responsibilities of researchers, and common techniques for minimizing risks to subjects. (Prerequisites: Successful completion of one course in Anthropology (ANTH), Sociology (SOCL) or International and Global Studies (INGS) is required.) **Lecture 3, Credits 3**

SOCI-302 **Statistics in the Social Sciences**
The research conducted by sociologists and anthropologists generates large, complex data sets that are difficult to interpret subjectively. We will explore the basic quantitative tools that sociologists and anthropologists can use to understand these data sets and learn how to craft a research question and research design that utilize quantitative data, how to select appropriate quantitative techniques and apply them, how to present results, and how to critically evaluate quantitatively based knowledge claims. **Lab 2, Credits 3**

SOCI-303 **Statistics in the Social Sciences**
The research conducted by sociologists and anthropologists generates large, complex data sets that are difficult to interpret subjectively. We will explore the basic quantitative tools that sociologists and anthropologists can use to understand these data sets and learn how to craft a research question and research design that utilize quantitative data, how to select appropriate quantitative techniques and apply them, how to present results, and how to critically evaluate quantitatively based knowledge claims. **Lecture 2, Credits 3**

SOCI-305 **Crime and Human Rights: Sociology of Atrocities**
How is the murder of one person different from that of one million? Why is one act a crime while the other simply history? While mass atrocities have occurred, and continue to occur, throughout human history, it is only until recently that international laws started to name and criminalize these atrocities as human rights violations. This course revolves around the worst mass atrocities in recent human history and the responses they receive, focusing on violent crimes perpetrated by the state and the emerging human rights regime in response to such crimes after WWII. As a class, we will seek answers to questions such as: Why do ordinary people participate in extreme violence against their neighbors? How is violence sanctioned and organized by the state different from interpersonal violence? Who is responsible for state-sanctioned violence? What is the role of those who do not participate in or stop the violence? What is the role of human rights and human rights laws in preventing state-sanctioned violence? What are the possible responses to state-sanctioned violence under human rights laws? What are the consequences of such responses? Whether/how does social context matter in the way mass atrocities unfold and the responses they receive? To answer these questions, we will examine historical documents, watch movies, read literature, and study scholarly work. This course will be useful for students who seek careers in areas such as international law, diplomacy, human rights advocacy/prosecution, and criminal justice in general. **Lecture 3, Credits 3 (Fall, Spring)**

SOCI-315 **Global Exiles of War and Terror**
Daily we watch, seemingly helplessly, as people are displaced from their communities, homelands, and countries and subsequently seek asylum around the world, sometimes within our own local communities. Causes of displacement include war, violence, persecution, and modes of terror that increasingly affect the lives of women and children. In addition to the loss of human life and potential, the ensuing consequences of violent displacement include poverty, disease, physical and psychological trauma, hopelessness, and vulnerability to human rights abuses. In this course, we explore how the rights and dignity of refugees can be protected. We also examine resettlement processes and, for those who are eventually repatriated, we address how they can successfully reintegrate into reconstructing societies that remain barely functional. Most importantly, we consider how the trauma of displacement can be minimized. **Lecture 3, Credits 3 (Fa/sp/su)**

SOCI-322 **Health and Society**
What would a healthy society look like? What questions should we be asking of those in power to ensure health equity? What is health equity? The objective of this course is to develop a sociological language for answering these and other questions. To do so, students will evaluate the relationship between health and society – that is, the connections between contemporary health disparities and today's social, physical, and political economic environments. This includes an analysis of macro-factors (climate change, environmental pollution, global and/or national economies, laws) and micro-factors (social media, neighborhood conditions, green spaces, poor- or low-quality housing, and leisure spaces). The course emphasizes that health is impacted by the social circumstances into which people are born; inequitable distributions of power; and social/legal categories of exclusion and inclusion. Though sociological in orientation, this course resonates with the disciplinary and professional aims of medical anthropologists, public health professionals, community health practitioners, and anyone committed to eradicating health disparities. **Lecture 3, Credits 3 (Annual)**

SOCI-330 **Urban (In)Justice**
With a focus on forms of (in)justice in urban communities worldwide, we investigate the impact of race, class, and gender and related systems of unequal power relations on perpetuating patterns of social, political, economic, and environmental oppression (policing, hunger, pollution, violence, disease). How do ways of governing urban populations affect the lives of inner city residents and their demands for justice when attempting to navigate the everyday urban worlds? Specific course topics include both historical and contemporary perspectives on urban (in)justice locally, in Rochester NY, and nationally, across the U.S., and in a global comparative framework. Thereby the effects of crime, violence, and inequality on people in urban neighborhoods are also examined among and within nations. By the end of the semester, students should be able to identify and explain various theories that seek to explain (in)justice patterns in the urban context at local, national and global levels. **Lecture 3, Credits 3 (Fall or Spring)**

SOCI-345 **Urban Poverty**
Urban poverty has been recognized as a persistent problem in the United States since the middle of the last century. In many cities, poverty is associated with high levels of teenage pregnancy, low levels of employment, limited educational attainment, chronic community-based health problems, and high levels of crime. This course examines causes, consequences, and proposed policy solutions to urban poverty. Special emphasis will be paid to U.S. urban poverty. **Lecture 3, Credits 3 (Fall or Spring)**

SOCI-350 **Social Change**
This course describes and applies competing explanations for major transitions in a variety of institutions, including the economy, work, politics, family and education. These transitions are seen within historical and global contexts, but the interplay of these changing social structures with individual experience is explored as well. Topics include economic, racial and gender stratification, culture, labor-management relations, and the source and consequences of technological change. Students will learn to understand, assess, and manage social change rather than to simply react to it. **Lecture 3, Credits 3 (Fall or Spring)**

SOCI-355 **CyberActivism: Diversity, Sex, and the Internet**
Sociologists look to cyberspace to test theories of technology diffusion and media effects on society. This course explores the Internet's impact on communities, political participation, cultural democracy, and diversity. How have digital technologies and electronic information flows shaped or diminished inequalities of gender, sex, and race? For instance: new electronic technologies have pushed the cultural and physical boundaries of how we have sex; with whom we have sex; and with what we have sex and/or have observed having sex, such as sex toys and avatars. The sociological implications of this new technology depend on economic, legal, and policy decisions that are shaping the Internet as it becomes institutionalized. The course analyzes such new forms of cyber-democracy with a focus on issues of gender, sex, and race. **Lecture 3, Credits 3 (Spring, Summer)**

SOCI-361 **Sociology of Numbers**
Much of the knowledge of our social worlds has been digitized. This course explores how social technologies shape our relationships, personal lives, and sense of self. The metric manufacture of diversity has produced new forms of population management and inequality. Our biographic histories as citizens, consumers, workers/professionals, parents, lovers, and social media users are collected as data-bites and assessed in metric terms, thereby forging new sets of identities. The transformation of people into numerical entities is an act of statistical objectification. This process frames the creation of social and racial typologies, and is well demonstrated by the US census. Students will investigate the formation of racial, ethnic, and gender identities in the context of the accelerated desire to digitize humanity. **Lecture 3, Credits 3 (Fall or Spring)**

SOCI-395 **Borders:Humans, Boundaries, and Empires**
Borders are more than walls; they are social constructions with real consequences. This course examines the creation and consequences of borders. It discusses how borders developed historically, how borders function as tools of population management in places and systems far from the borderlands, and the politics and experiences of border crossing. We will look for borders both between and within nation states when addressing these issues. The course will utilize a variety of materials including but not limited to scholarly sources, policy transcripts, popular cultural products (e.g. films and TV shows), and art (e.g. poetry, paintings). Students will play an active role in determining specific course topics, though they can expect to discuss a range of relevant issues including contemporary immigration politics, Indigenous rights, the war on terror, border disputes and armed conflicts, privatization of immigration management, displacement and segregation of domestic populations, and border activism. This course provides students with tools that ground and expand their understanding of borders, preparing them for participation in one of the most important public debates of our time. The purview of this course is relevant for those who aspire toward professions in public policy, law enforcement, public service, law, and community-organizing, among others. **Seminar 3, Credits 3 (Fall, Spring)**

SOCI-451 **Economics of Women and the Family**
Women make choices concerning marriage, fertility and labor market participation on the basis of many factors, including government policies targeting those decisions. This course uses economic theory and empirical research in order to describe the changing demographic profile of families, poverty, and the labor force and to explore how economic theory and practice fit into the larger social science goals of describing human behavior by focusing on women and on the family. **Lecture 3, Credits 3 (Fall)**

SOCI-489 **Topics in Sociology**
This topics course focuses on specific themes or issues in sociology, chosen by the instructor, vetted by the department chair, announced in the course subtitle on SIS, and developed in the syllabus. The topics of this course will vary, but the course number will remain the same. Students may repeat the course for credit, but may not repeat a topic. **Seminar 3, Credits 3 (Fall, Spring)**

SOCI-498**Practicum**

Students will apply the accumulated knowledge, theory, and methods of the discipline to problem solving outside of the classroom. The Practicum may consist of internship, study abroad, or archaeological or ethnographic field school (consisting of at least 160 hours, completed over at least 4 weeks). (This class is restricted to undergraduate students with at least 3rd year standing.) **Internship, Credits 0 - 16 (Fall, Spring, Summer)**

SOCI-499**Co-op**

Paid work experience in a field related to sociology or urban studies (at least 160 hours of work, completed over at least four weeks). Students will apply the accumulated knowledge, theory, and methods of the discipline to problem solving outside of the classroom. (3rd year status and permission of instructor) (This class is restricted to undergraduate students with at least 3rd year standing.) **CO OP, Credits 0 (Fall, Spring, Summer)**

SOCI-501**Senior Research Project**

Students will write a library-based research paper or research proposal, bringing to bear the knowledge, methodological skills, and theoretical perspectives accumulated during the prior years of study. (Prerequisites: This class is restricted to students with at least 4th year standing.) **Seminar 3, Credits 3 (Fall)**

SOCI-502**Scholar's Thesis I**

This is the first course of a two-semester Scholar's Thesis sequence in sociology, in which students will conduct an original research project. In this first course, working with a thesis advisor, students will formulate a research question, conduct a literature review, prepare the research design, write a research proposal, and begin data collection, following the conventions of the discipline. (Prerequisites: This class is restricted to students with at least 4th year standing and at least a 3.2 cumulative GPA.) **Thesis 3, Credits 3 (Fall)**

SOCI-503**Scholar's Thesis II**

This is the second course of a two-semester Scholar's Thesis sequence in sociology or urban studies, in which students will conduct an original research project. In this second course, working with a thesis advisor, students will finalize data collection, analyze the data, write and defend a thesis paper, following the conventions of the discipline. (4th year status, 3.2 gpa, and permission of thesis advisor) (Prerequisites: SOCI-502 or equivalent course.) **Research, Credits 3 (Fall, Spring, Summer)**

SOCI-599**Independent Study**

The student explores in depth a topic of choice, under supervision of a faculty member. The student will typically meet weekly with the instructor to discuss the readings and will write paper(s) that synthesize and critique them, or the student may work with the faculty member on original research. (permission of the instructor) (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 12 (Fall, Spring, Summer)**

Visual Arts

VISL-100**Introduction to Visual Arts**

This course will develop students' ability in perceiving worth in objects of art through consideration of fundamental concepts in painting, sculpture and architecture, involving analysis, interpretation and principles of aesthetics. **Lecture 3, Credits 3 (Fall, Spring)**

VISL-120**Introduction to Film**

This course provides the student with an introduction to film as an art form. The course presents a vocabulary for film analysis as well as the critical and analytical skills for interpreting films. The course examines the major aesthetic, structural, historical, and technical components of film. It considers how a film works, by looking internally at the multiple aspects that comprise the construction of a film, and externally at how a film affects the viewers. Students will watch a variety of feature films, primarily American, ranging in date from the 1940's through the 2000's. Clips from alternative films and foreign films will also be screened and discussed. Any artistic background in film, music, theatre, painting, sculpture, etc., is helpful, but no specific technical knowledge of film, video, or photography is required or expected. **Lecture 3, Credits 3 (Fall, Spring)**

VISL-140**Introduction to Visual Culture**

This course provides an introduction to Visual Culture studies, an interdisciplinary field of study that explores the ways in which our lives are shaped through contact with, and consumption of, images, designed objects and visual forms of media, communication, and information. Students will develop a critical understanding of different aspects of contemporary visual culture as well as an awareness of its recent historical development. **Lecture 3, Credits 3 (Fa/sp/su)**

VISL-206**Queer Looks**

In this course we examine representations of queer sexuality in art, film and popular culture beginning in the repressive 1950s, followed by the Stonewall Riots of 1969. We situate the birth of gay liberation in the U.S. in the context of the civil rights struggles, feminism and the anti-war movement. We turn to the work of Andy Warhol that looms over the post-war period, challenged subsequently by the onset of AIDS and the work of General Idea and Act-Up, on the one hand, and the more graphically provocative work of Robert Mapplethorpe, on the other. We examine the diversification of the queer community as transgendered identity asserts itself and the opening of popular culture to issues of diverse sexual identities. We explore expressions of queer sensibility outside of North America and Europe. We turn finally to the issue of gay marriage, both in the U.S. and abroad. **Lecture 3, Credits 3 (Spring)**

VISL-224**History and Theory of Exhibitions**

Art exhibitions are organized around a curatorial premise, a statement that articulates an idea allowing for the selection of work included in an exhibition. This course begins with an overview of exhibition history, starting with the transformation of the Louvre into the first public art museum following the French Revolution, where art history, a discipline developed in the 19th century, was enlisted to organize exhibition. The course then examines the proliferation of types of exhibitions that accompanies modernism, up to the present, paying close attention to the curatorial premise animating the exhibitions. **Lecture 3, Credits 3 (Fall, Spring)**

VISL-320**Contemporary Cinema: Fact and Fiction**

We will study cinema in the United States and abroad from the mid-20th century to contemporary screen cultures. We will consider shorts, war documentaries, biographical and autobiographical films, animation, mockumentaries, video diaries, and immersive installations. Questions we will ask include: How does cinema represent or transform social and historical events in local and global contexts? Which ethical and aesthetic responsibilities does a filmmaker have to their audience and filmed subjects? What ethical questions do the films raise for us as spectators? How do we understand the role of media technologies in the making of these films? We will investigate the structures, techniques, and ideologies that identify cinematic practices as fiction or non-fiction and consider films that challenge these representational systems, helping us examine the line between fact and fiction. Students will complete a film critique as a class assignment. **Lecture 3, Credits 3 (Fall or Spring)**

VISL-373**American Film Since the Sixties**

This course examines the history and aesthetics of the motion picture in the United States since the late 1960s, when the classical studio era ended. Emphasis will be placed on the analysis of both the work of major American filmmakers and the evolution of major American film genres between 1967 and 2001. Among the filmmakers to be studied are Kazan, Cassavetes, Penn, Coppola, Scorsese, Spielberg, Allen, Seideman, Lee, Burton, Altman, Tarantino, Coen, and Lynch. The course will consider the evolution of such traditional Hollywood genres as the gangster film, the romantic comedy, and the Hollywood movie, study the development of new, blended genres, investigate the rise of the blockbuster, explore the rise of the Independents, and follow the aesthetic changes that occurred since the 1967. The films will be studied within the context of contemporary cultural and political events, and will be discussed from several viewpoints, including aesthetic, technical, social, and economic. The ways in which gender, race, and class are constructed through the movies will also be a major focus of study. **Lecture 3, Credits 3 (Spring)**

VISL-374**Art in the Age of the New Deal**

In this course we examine art in the age of the New Deal; that is, the art of the 1920's and the 1930's, with a particular emphasis on the artwork produced through the programs of the Roosevelt Administration's New Deal. These programs sponsored the visual arts, as well as film, theater, literature, music, and dance. We study the art produced through this sponsorship in the context of the evolution of twentieth century modernism, mostly European, that had begun to influence American art. We will look at the stylistic and ideological affinities of the figurative style, known as the American scene, with the Mexican muralists of the 1920's and examine other government-sponsored social realist art of the 1930's, notably German and Russian. **Lecture 3, Credits 3 (Spring)**

VISL-376**Visual Culture Theory**

Visual Culture studies recognize the predominance of visual forms of media, communication, and information in the contemporary world, investigating both "high" cultural forms such as fine art, design, and architecture and popular "low" cultural forms associated with mass media and communications. Visual Culture studies represents a turn in the discourse of the visual, which had focused on content-based, critical readings of images, and has since broadened its approach to additionally question the ways in which our consumption and production of images and image based technologies are structured. Analyzing images from a social-historical perspective, visual culture asks: what are the effects of images? Can the visual be properly investigated with traditional methodologies, which have been based on language, not imagery? How do images visualize social difference? How are images viewed by varied audiences? How are images embedded in a wider culture and how do they circulate? **Lecture 3, Credits 3 (Fall)**

VISL-377

Imag(in)ing Rochester

This course examines the ways in which culture, ethnicity, languages, traditions, governance, policies and histories interact in the production of the visual experience. We will approach the campus of RIT and the city of Rochester and their various urban spatial forms as image experiences, subject to interpretative strategies and the influence of other discourses. We will wander the well-traveled and the unbeaten paths, participating in and interrogating a wide range of our campus' and city's treasures and embarrassments, secrets and norms. In addition to these field trips, we will be reading from literature and cultural studies, as well as viewing films, advertisements and websites, and possibly attending theatrical and music performances or sporting events. **Lecture 3, Credits 3 (Fall)**

VISL-383

Traumatic Images

This course investigates visual culture and its imagistic response to life's crises. Problems of identity and identification will be explored and confronted through works of photography, painting, mixed media, new media and film of the 19th, 20th, and 21st centuries. Beginning with the late 19th Century vogue for images of hysterical women, crippled black-sheep family members and dead loved ones (as corpses and as ghosts), we then move on to consider the last century's fascination with pain and suffering, disease and violence, struggle and survival and then the 21st century's emphasis on terrorism. Specifically, we will focus on the gendering of images and imaging as disturbing pictures work to defy the formal and theoretical distinction between private and public, personal, and collective experience and manage the often conflicting responsibilities to self, family, religion, race, nation, and society. **Lecture 3, Credits 3 (Spring)**

VISL-384

Art of Dying

This course explores the experience of dying a profoundly human and universal experience as it is represented by artists who are themselves facing immanent death. The unique and deeply personal process of each dying artist is crucially informed by social, cultural and historical as well as artistic contexts. The course will focus primarily on visual artists and writers living with and dying of disease - such as AIDS, cancer and cystic fibrosis as well as mortality and age. Topics such as aesthetics, artistic media, representation, grief, bereavement, illness, care-giving, aging, and the dying process will be considered within the context of issues of race, class, ethnicity, sexuality, gender and community values. Some of the artists covered will be Jo Spence, Hannah Wilke, Elias Canetti, Bob Flanagan, Herve Guibert, Tom Joslin, Laurie Lynd, Audre Lorde, Charlotte Salomon, Keith Haring, Frida Kahlo, Bas Jan Ader, Ted Rosenthal, Felix Gonzalez Torres, Keith Haring, Eric Steel, Derek Jarman, Eric Michaels, and David Wojnarowicz. We will also explore some of the critical theory of Roland Barthes, Michel Foucault, Elaine Scarry, Susan Sontag, and Ross Chambers. **Lecture 3, Credits 3 (Spring)**

VISL-388

Gender and Contemporary Art

This course traces the historical development of women's activism in the art world from the 1970s to the present. We will interpret how this art activism, which artists and scholars alike have referred to as the feminist art movement, has examined how gender informs the ways art is made, viewed, conceptualized in history and theory, and exhibited in museums and visual culture, in a range of cultural contexts. We will also analyze how current artists, critics, and curators continue to build on this history, in particular how they use the concept of gender intersectionality to develop a variety of new creative practices, theories, modes of exhibition and social engagement. **Lecture 3, Credits 3 (Fall, Spring)**

VISL-440

Deaf Art and Cinema

Students will examine the context in which specific cultural groups have chosen to create works about their experiences. They will go on to explore a wide range of artistic works representing the Deaf experience in visual arts and cinema. Students will be expected to analyze works in terms of cultural symbols and themes. Attention will be given to historical context (personal and collective) that has helped to shape many of these works, motifs, and messages. Students will write and present in-depth papers examining specific works and artists/filmmakers. In addition, students will be expected to create an original artwork and a collaborative short film. **Lecture 3, Credits 3 (Fall, Spring)**

VISL-489

Topics in Visual Culture

Visual Culture is an interdisciplinary field of study that explores the role of visual media in everyday life and its critical function in the dissemination of ideas in the public sphere. Emphasizing comparative critical approaches to the convergence of art and popular media, courses engage globalized visual media ranging from photography, television and film, to new media, architecture, design, and art (painting, sculpture and multimedia forms) in the context of such social arenas as art, news, science, advertising, and popular culture. **Lecture 3, Credits 3 (Fall, Spring)**

VISL-599

Independent Study

A program of study executed by an individual student with assistance and guidance by an instructor, outside a classroom setting. Guidelines for designing and gaining approval for an independent study are provided in College of Liberal Arts Policy I.D. **Ind Study, Credits 1 - 12 (Fall, Spring, Summer)**

Women and Gender Studies

WGST-200

Foundations of Women and Gender Studies

Women's and Gender Studies is the academic manifestation of feminism. This interdisciplinary course interrogates the social constructions, political systems, and historical rhetorics that have produced and maintain hegemonic power structures. In this course you will examine key feminist, queer, and critical race writings and discourses, study the rise of feminist thought, and consider the history of women's activism and the women's rights movements from Suffrage to the present day. The course will also consider the application of feminist theory made visible through the rise of new and intersectional social identity movements. **Lecture 3, Credits 3 (Fall)**

WGST-205

Feminist Practices of Inquiry

This course aims at introducing students to the diverse ways in which feminist and gender studies practitioners (scholars, writers, artists, and activists) have critically analyzed, challenged, and creatively reinvented predominant methods, models, and practices of knowledge production in various areas of the natural and social sciences, the medical arts, the humanities, and the visual and performing arts. Questions to be considered include: What constitutes feminist practices of inquiry? How do feminist research practices approach issues of objectivity and subjectivity? How does one formulate a feminist question? What key questions guide feminist researchers and how can we apply those questions to a variety of research topics? How do feminist practices of inquiry intersect with race, class, gender, ethnicity, nationality, sexualities, identity-formation processes, (dis)abilities, age? How do feminist research practices produce transformations, emancipation, and increased fairness of representation? **Lecture 3, Credits 3 (Spring)**

WGST-206

Queer Looks

In this course we examine representations of queer sexuality in art, film and popular culture beginning in the repressive 1950s, followed by the Stonewall Riots of 1969. We situate the birth of gay liberation in the U.S. in the context of the civil rights struggles, feminism and the anti-war movement. We turn to the work of Andy Warhol that looms over the post-war period, challenged subsequently by the onset of AIDS and the work of General Idea and Act-Up, on the one hand, and the more graphically provocative work of Robert Mapplethorpe, on the other. We examine the diversification of the queer community as transgendered identity asserts itself and the opening of popular culture to issues of diverse sexual identities. We explore expressions of queer sensibility outside of North America and Europe. We turn finally to the issue of gay marriage, both in the U.S. and abroad. **Lecture 3, Credits 3 (Spring)**

WGST-210

Introduction to LGBTQ+ Studies

This introductory course examines a broad range of gay, lesbian, bisexual, transgender, and queer issues within the historical, psychological, racial, theological, cultural, and legal contexts in which we live. Students will learn the historical and theoretical foundations of LGBTQ+ studies as well as the contemporary implications for family, work, religion, and law for LGBTQ+ people and the mainstream society. Students will have the opportunity to compare the regulation of sexual orientation across different gender, racial, and socioeconomic communities. **Lecture 3, Credits 3 (Fall)**

WGST-230

Men, Males, and Masculinities

Who and what defines a man? What challenges might the process of manhood present? How does one's masculine expression align or not align with family or societal definitions? How are men harmed by unattainable ideas of manhood? What advantages and privileges come along with embodying maleness? What impacts does masculinity have on men's relationships (with women, with other men, as fathers, as sons)? What does it mean to be a man of color, a working-class man or a gay man? Is masculinity innately violent or aggressive? This course uses a critical approach to examine individual, institutional, and societal understandings of what it means in general to be a man. It explores models of masculinity in conjunction with analyses of race, class, disability, and sexuality. It analyzes the common and diverse experiences of how some human beings are socialized and/or choose to express their masculinity in healthy, unique, hegemonic and sometimes problematic ways. It probes how some models of (toxic or hegemonic) masculinity promote hierarchies of power and privilege in groups, organizations, and institutions. And it investigates ways in which toxic forms of masculinity can be broken down and rewritten to work toward a healthier, more just (and less oppressive) society for all. **Lecture 3, Credits 3 (Fall)**

WGST-235

Women, Work, and Culture

In this course, we analyze historical and contemporary patterns of gender, race/ethnicity, sexuality, and the organization of work. Using the theoretical perspectives we analyze the work historically undertaken by women in societies and its relationship to broader political and economic structures. While our primary focus is on the U.S., we will also conduct a cross-cultural analysis of gender and work in developing and industrializing societies. Specific issues include gender discrimination (e.g., wage discrimination, sexual harassment), sexuality, reproduction, and women organizing to control their work and working conditions. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

WGST-237**Psychology of Women**

The purpose of this course is to examine the psychology and lives of girls and women. In addition to the influence of culture, biological and genetic differences will be highlighted for each of the different topics. The topics covered include gender stereotypes, the development of gender roles, gender comparisons, love relationships, sexuality, motherhood and violence against women. (Prerequisites: PSYC-101 or PSYC-101H or completion of one (1) 200 level PSYC course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

WGST-240**Human Sexuality**

This course provides an overview of human sexuality through the lenses of biology and psychology. What causes sexual behavior and why do some individuals display different sexual behaviors than others? Human sexual physiology, attitudes, beliefs, and behaviors are highly diverse. Coursework will examine the ways in which human sexuality varies among individuals, across groups, and throughout the lifespan. Multiple explanations for sexual behavior will be considered, drawing from evolutionary psychology, learning theory, social psychology, and biology. Atypical and harmful sexual behaviors will be addressed as well. Throughout the course, students will learn how social science research techniques have been used to expand the field of human sexuality and how empirical inquiry can differentiate myths from facts. (Prerequisites: PSYC-101 or PSYC-101H or completion of one (1) 200 level PSYC course.) **Lecture 3, Credits 3 (Spring)**

WGST-245**Prostitution and Vice**

This course will examine prostitution and vice in the United States and globally. Through empirical scholarship, various issues will be examined including issues faced by sex workers including crime, victimization, health and safety, and law and policy issues. Quality of life issues for communities will also be examined. (Prerequisites: CRIM-110 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

WGST-246**History of Women in Science and Engineering**

Using biographical and social-historical approaches, this course examines the history of women's involvement in science and engineering since the birth of modern science in the seventeenth century; the historical roots of gender bias in the Western scientific enterprise; and the influx of women into science and engineering since the mid-to-late 20th century. Cross-listed with women's and gender studies. **Lecture 3, Credits 3 (Spring)**

WGST-250**Domestic Violence**

This course focuses on domestic violence in the United States and globally. Various types of domestic violence will be examined, including intimate partner violence, child abuse, and elder abuse. The course will also examine criminal justice responses to domestic violence, including police, court processing of domestic violence cases and punishment of domestic violence offenders. **Lecture 3, Credits 3 (Fall)**

WGST-255**Seminar on Sexual Violence**

This course focuses on sexual violence in the United States and globally. Various types of sexual violence will be examined, including incest, elder abuse, and male victimization. The course will also examine criminal justice responses to sexual violence, including police, court processing of sexual violence cases and punishment and treatment of sexual offenders. (Prerequisites: CRIM-110 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

WGST-265**Women and Crime**

This course deals with women as criminal offenders and as victims of crime, focusing upon theories about women in crime, types of crimes committed, patterns of criminality and the treatment of women offenders. Also examines the role of women as law enforcement officers, judges, lawyers and correctional officers in the criminal justice system. (Prerequisites: CRIM-110 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

WGST-282**Women, Gender, and Computing**

Popular attention often focuses on a few prominent women in computing history, such as Ada Lovelace, Grace Hopper, and the ENIAC programmers. But many more women were part of this history: as inventors, programmers, operators, and users of information and communication technologies. Investigating their legacies, we will discuss in this course how computing turned into an increasingly masculine field, what it meant for women and men to work in a male-dominated field, how the gendering of computing technologies and algorithms affected the identities and lives of their users, and how gender intersected online and offline with other dimensions of diversity, such as class, race, and ability. This course provides the theoretical concepts and historical overview that allow for a historically informed discussion of women, gender, sexuality, and computing today. **Seminar 3, Credits 3 (Spring)**

WGST-290**American Women's and Gender History**

This course surveys women's history in the United States from the colonial period to present. The course moves chronologically and thematically, focusing on the diversity of women's experiences across race, class, and geography as well as the construction of dominant gender norms. Topics include Native American, African American, and Euro-American women in colonial America; the Industrial Revolution and the ideology of domesticity, Women in the American West; women's paid and unpaid work; sexuality and reproduction; women's activism; and women's experiences of immigration and family life. **Lecture 3, Credits 3 (Fall)**

WGST-291**The History of Families and Children in the U.S.**

The family is at the center of contemporary political debates involving social policies, gender roles, citizenship, marriage, and the role of the state. Politicians and commentators frequently invoke a mythical American family, one that is conflict-free, independent, and unchanging. These idealized depictions mask a far more complicated and richer historical reality of the development of family structures in the U.S. This course will examine both the diverse experiences of actual families in the American past, including queer families, and changing ideologies about the family and childhood. Students will have the opportunity to write a history of their own family, or to complete an alternative research paper. **Lecture 3, Credits 3 (Spring)**

WGST-309**Feminist Theory**

This course examines the main currents in contemporary feminist thought. Feminist theory explores the nature and effects of categories of sex and gender upon our ways of living, thinking and doing, while also challenging how gendered assumptions might shape our conceptions of identity and inquiry more generally. Different conceptions of sex and gender will be discussed, and the course will investigate how these concepts affect our lives in both concrete and symbolic ways. Special attention will be paid to how gendered assumptions color our understanding of knowledge production, experiences of embodiment and emotion, public and private activities, and the nature of ethical decision making. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

WGST-318**Philosophies of Love, Sex, and Gender**

Love is indeed one of the most central concerns in everyone's life; yet, we spend very little time thinking conceptually about love in its various forms, aspects, implications, nuances, benefits, detriments, and harms. In this course, we will examine views from classical, medieval, modern, and contemporary thinkers on various kinds of love, including some controversial versions of it; we will consider the relation of love in its various forms to desire, emotions, physical intimacy, seduction, sex, sexuality, sexual orientation, and the construction of personal identity; and we will analyze how the various forms of love affect and are affected by gender norms, roles, and images. **Lecture 3, Credits 3**

WGST-330**Performing Identity in Popular Media**

This class is a critical, theoretical, and practical examination of the constitution and performance of personal identity within popular media as it relates to identity politics in everyday life. Through lectures, readings, film, and critical writing, students will examine elements of personal identity and diversity in popular media in order to foster a deeper understanding of how identity is constructed and performed in society. **Lecture 3, Credits 3 (Fall)**

WGST-335**Women and the Deaf Community**

Deaf history, as a field, has often neglected the story of deaf women. Scholar Arlene B. Kelly has recently asked, Where is deaf herstory? This course seeks to correct that gender imbalance in deaf history. We will study deaf women's history. This will include a consideration of deaf-blind women, as well, as women like Helen Keller were often the most famous deaf women of their era. But this course also seeks to look at the role of hearing women in deaf history. Hearing women dominated the field of deaf education in the late nineteenth century. They had a tremendous impact on the lives of deaf children and the events of deaf educational history. Hearing women were also important figures in deaf history as mothers. As mothers of deaf children, hearing women were frequently asked to behave as teachers in the home. Their embrace of this role often led them to endorse oral education, and oppose the sign language. Hearing mothers in this way were pitted against their adult deaf daughters, who frequently went on to learn sign language against their mothers' wishes. The historically complex relationship between women and the deaf community will be explored in this course. **Lecture 3, Credits 3 (Fall)**

WGST-342**Gender, Science, and Technology**

This course explores the importance of gender within Western science and technology. It considers how masculine and feminine identities are socially and culturally shaped, how sex and gender are being significantly transformed, and how rethinking gendered practices may help make science and technology fairer and more responsive. Cross-listed with women's and gender studies. **Lecture 3, Credits 3 (Fall)**

WGST-351 Gender and Sexuality in Hispanic Studies
This course introduces students to the study of gender and sexuality in cultural production from the Hispanic world. Students will read, view, and discuss diverse works from a variety of historical periods and geographical regions that deal with gender identity, sexuality, and interrelated social movements. This course refines students' skills through discussions, presentations, and writing exercises on readings, lectures, and film screenings. Students will also develop research skills as they complete a project on a topic chosen in consultation with the instructor. The critical approach that will inform this course is feminist thought. **Lecture 3, Credits 3 (Fall)**

WGST-352 Globalization and Gender through Chinese Cinema: From Kungfuto World Factory
This course surveys Chinese cinema from its beginning to the present with special attention to its transnational connections and gender representation. Films from the mainland, Taiwan, and Hong Kong will be examined in-depth for their aesthetic quality and techniques, and equally important, against their socio-historical, political, economic, and cultural contexts. Topics include Kungfu films, women's cinema, documentation of globalization, independent filmmaking and social activism, and more. The class is conducted in English. Assigned films will be in Chinese with English subtitles. **Lecture 3, Credits 3 (Biannual)**

WGST-357 Communication, Gender, and Media
This course examines the relationship between gender and media communication with specific attention to how gender affects choices in mass media and social media practices. Students explore how gender, sexual orientation, sexuality and social roles, affect media coverage, portrayals, production and reception. They consider issues of authorship, spectatorship (audience), and the ways in which various media content (film, television, print journalism, advertising, social media) enables, facilitates, and challenges these social constructions in society. The course covers communication theories and scholarship as it applies to gender and media, methods of media analysis, and topics of current interest. **Lecture 3, Credits 3 (Biannual)**

WGST-361 Queering Gender
This course begins with the concept that sexuality, gender and gender identity is neither fixed nor innate. Many people who adopt a definition or expression of gender different from society often identify themselves as queer. The study of this movement is referred to as queer theory. This course examines the concepts of sex, gender, and gender expression of straight, gay, lesbian, bisexual and transgender people of all ages, races, and socioeconomic classes within the context of the larger society in which we live. Students will explore the unique political, legal, and interpersonal challenges faced by those embracing queer identity as well as the diversity of gender identities and expressions. **Lecture 3, Credits 3 (Spring)**

WGST-375 Women/Gender/Art
This course examines the role of women in the visual arts as both images makers and subject matter in order to see how gender plays a role in the conceptualization of creativity and art. Among the topics to be discussed are: the construction of femininity and gender in the patriarchy; art as an ideological practice; women, art, and society; art history, art education, and art evaluation; women artists and their contemporaries. **Lecture 3, Credits 3 (Spring)**

WGST-383 Traumatic Images
This course investigates visual culture and its imagistic response to life's crises. Problems of identity and identification will be explored and confronted through works of photography, painting, mixed media, new media and film of the 19th, 20th, and 21st centuries. Beginning with the late 19th Century vogue for images of hysterical women, crippled black-sheep family members and dead loved ones (as corpses and as ghosts), we then move on to consider the last century's fascination with pain and suffering, disease and violence, struggle and survival and then the 21st century's emphasis on terrorism. Specifically, we will focus on the gendering of images and imaging as disturbing pictures work to defy the formal and theoretical distinction between private and public, personal, and collective experience and manage the often conflicting responsibilities to self, family, religion, race, nation, and society. **Lecture 3, Credits 3 (Spring)**

WGST-384 Art of Dying
This course explores the experience of dying a profoundly human and universal experience as it is represented by artists who are themselves facing immanent death. The unique and deeply personal process of each dying artist is crucially informed by social, cultural and historical as well as artistic contexts. The course will focus primarily on visual artists and writers living with and dying of disease - such as AIDS, cancer and cystic fibrosis as well as mortality and age. Topics such as aesthetics, artistic media, representation, grief, bereavement, illness, care-giving, aging, and the dying process will be considered within the context of issues of race, class, ethnicity, sexuality, gender and community values. Some of the artists covered will be Jo Spence, Hannah Wilke, Elias Canetti, Bob Flanagan, Herve Guibert, Tom Joslin, Laurie Lynd, Audre Lorde, Charlotte Salomon, Keith Haring, Frida Kahlo, Bas Jan Ader, Ted Rosenthal, Felix Gonzalez Torres, Keith Haring, Eric Steel, Derek Jarman, Eric Michaels, and David Wojnarowicz. We will also explore some of the critical theory of Roland Barthes, Michel Foucault, Elaine Scarry, Susan Sontag, and Ross Chambers. **Lecture 3, Credits 3 (Spring)**

WGST-388 Gender and Contemporary Art
This course traces the historical development of women's activism in the art world from the 1970s to the present. We will interpret how this art activism, which artists and scholars alike have referred to as the feminist art movement, has examined how gender informs the ways art is made, viewed, conceptualized in history and theory, and exhibited in museums and visual culture, in a range of cultural contexts. We will also analyze how current artists, critics, and curators continue to build on this history, in particular how they use the concept of gender intersectionality to develop a variety of new creative practices, theories, modes of exhibition and social engagement. **Lecture 3, Credits 3 (Fall, Spring)**

WGST-414 Women and Gender in Literature and Media
This variable topic course examines one or more themes, figures, movements, or issues associated with the representation of women and gender in literature and media, and/or associated with the historical, cultural, and theoretical questions provoked by women as producers and consumers of media and texts. The topic for the course is chosen by the instructor, announced in the course subtitle, and developed in the syllabus. The course can be taken multiple times provided that the topic being studied has changed. **Lecture 3, Credits 3 (Fall, Spring)**

WGST-449 Topics in Women's and Gender Studies
This variable topic course examines one or more themes, figures, movements, critical questions or issues in the areas of women's and gender studies. The topic for the course is chosen by the instructor, announced in the course subtitle, and developed in the syllabus. Topics in WGST can be taken multiple times provided the topic(s) being studied has changed. **Lecture 3, Credits 3 (Spring)**

WGST-451 Economics of Women and the Family
Women make choices concerning marriage, fertility and labor market participation on the basis of many factors, including government policies targeting those decisions. This course uses economic theory and empirical research in order to describe the changing demographic profile of families, poverty, and the labor force and to explore how economic theory and practice fit into the larger social science goals of describing human behavior by focusing on women and on the family. **Lecture 3, Credits 3 (Fall)**

WGST-459 Topics in LGBTQ+ Studies
This variable topic course examines one or more themes, figures, movements, critical questions or issues in the areas of LGBTQ+ studies. The topic for the course is chosen by the instructor, announced in the course subtitle, and developed in the syllabus. Topics in LGBTQ+ Studies can be taken multiple times provided the topic being studied has changed. **Lecture 3, Credits 3 (Spring)**

WGST-481 Women in Politics
A study of feminist thought as it applies to the political, economic and social status of women and how it has been expressed through the women's political movement. Students study a number of public policies as they apply to and affect women and examine the opportunities for women to participate in the political process. **Lecture 3, Credits 3 (Spring)**

WGST-598 Advanced Project in WGSS
This individualized course allows students to work independently on their own creative project by applying themes and methodologies proper to women's, gender, and sexuality studies to an area of their own academic interest. The advanced project is carried out outside the classroom under the supervision of a WGSS faculty sponsor selected by the student. The project culminates in the production and public presentation, display or performance of a creative work (such as an artifact, a film, a videogame, installation art, a musical composition, a piece of design, a performance, a poster, an activist initiative, etc.) that incorporates women's, gender, and sexuality studies theory and/or practice. The final product must be accompanied by a written component that explains the critical or theoretical context for the project and provides an analysis of its content. Prior to enrollment in this course, students must submit a project proposal to their faculty sponsor, who will forward it to the WGSS Program Director for approval. The proposal should specify the topic and goal of the advanced project, the timeframe for its completion, and a venue for public dissemination (for guidelines for designing and gaining approval for an Advanced Project, see the guidelines for an Independent Study as provided in College of Liberal Arts Policy I.D). To submit a proposal for an Advanced Project in WGSS and receive an official WGST course grade, the student must have completed 3 courses in WGST core or co-listed courses, have a minimum GPA of 2.7 at the time of the application, and complete the work described in the proposal. (Prerequisites: Must have completed at least 3 WGST courses (core or co-listed), which includes at least one (WGST-200 or WGST-210) or equivalent courses.) **Ind Study, Credits 1 - 3 (Fall, Spring, Summer)**

WGST-599**Independent Study**

The Independent Study allows a student to pursue an area of academic or research interest within the field of women's, gender, and sexuality studies that goes beyond existing course work. The Independent Study is carried out outside the classroom under the guidance and with the assistance of a faculty sponsor. A student may register for an independent study project by submitting an Independent Study project proposal. Guidelines for designing and gaining approval for an Independent Study proposal are provided in College of Liberal Arts Policy I.D. To submit a WGST Independent Study proposal and receive an official course grade, the student must have completed 3 courses in WGST core or co-listed courses, have a minimum GPA of 2.7 at the time of the application, and complete the work described in the proposal. (Prerequisites: Completion of three (3) courses in WGST is required, including either WGST-200 or WGST-205 or equivalent course.) **Ind Study, Credits 1 - 3 (Fall, Spring, Summer)**

School of Individualized Study

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Course numbering: RIT courses are generally referred to by their alphanumeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100-299), upper division (300-599), or graduate level (600 and above).

Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.

Individualized Study

SOIS-101 **Individualized Study Seminar**
The required gateway course for students enrolled in the School of Individualized Study. Course provides an opportunity for students to explore the nature and function of academic disciplines. Students will have opportunities to develop and refine their transversal, transferrable, and 21st century skill sets and their relationship to traditional curriculum and experiential learning. (APPLAS-BS, APPLAS-AAS) **Lecture 1, Credits 1 (Fall or Spring)**

SOIS-128 **Community Folklife**
Students will learn about a variety of community-based cultural practices by engaging with international and regional examples of material culture, customs and rituals, and narrative traditions. Applying theoretical perspectives gained through readings and discussion, students will evaluate the way those traditions reflect class, gender, and ethnic identity. Students will also learn basic ethnographic research methods and document traditional cultural practices found in their own communities. **Lecture 3, Credits 3 (Spring)**

SOIS-101 **Paradigms and Worldviews**
This course examines how different paradigms and worldviews have shaped our understanding of the world and life, from antiquity to the present. This course is exploratory in nature. In other words, we will question who we are, how we fit into the world, and what ideas seem to define the world in which we live. How have different cultures, nations, and regions viewed the world differently? What are scientific paradigms? What is the Postmodern or the Posthuman? How can a cosmopolitan society reconcile different attitudes and belief systems? What happens when disparate worldviews or conceptual schemes collide or are threatened with cultural, economic, or political devastation? How should the individual relate to society? How should they relate to the environment? How have artists and writers addressed such questions? We will examine how these concepts have evolved in the modern era, especially, and how paradigms and worldviews have differed across the globe. Key authors and readings from the fields of cultural studies, sociology, anthropology, intellectual history, history of science, philosophy, psychoanalysis, and/or history of art will be discussed. **Lecture 3, Credits 3 (Fall)**

SOIS-202 **Individuals and Society**
This course examines how to understand the individual's role and ethical responsibilities in civil society, the economy, and the globe. The course is exploratory, collaborative, and participatory. The course will involve reading, discussion, and reflection on notable texts about individualism from antiquity to the present, as well as discussion sessions with notable individuals in our community. In consultation with the faculty instructor, students will develop a research and action plan based on their own sense of individuality. **Lecture 3, Credits 3 (Spring)**

SOIS-205 **Practicing and Assessing Leadership**
By integrating course concepts of leadership styles and theories with a leadership field experience, students will be able to assess their skills as a leader and create a plan for growth and development for future success. Each student will be required to create a leadership learning agenda and development plan at the beginning of the semester based on their current leadership experience. The learning agenda will identify goals for achievement and strategies for assessing and improving upon their effectiveness as a leader. **Lecture 3, Credits 3 (Fall, Spring)**

SOIS-211 **Exploring Innovation**
Innovation of some type occurs in all fields and disciplines. This course, which helps students develop an innovative mind set, discusses the nature of innovation, including what innovation is, the goals and objectives of innovation, how innovation happens, and reasons that innovations succeed or fail. Case studies in a variety of disciplines are explored to further understanding of innovation. (This class is restricted to undergraduate students with at least 2nd year standing.) **Lecture 3, Credits 3 (Fall, Spring)**

SOIS-214 **Introduction to Leadership Theory and Practice**
Leadership today is challenging at best when considering all the complexities of the 21st century work environment. In this course students will explore, discuss and practice effective strategies and behaviors to lead others, teams and organizations for high performance. Areas of focus include: leadership roles, theories and styles, creating a shared vision, coaching skills, teamwork and group dynamics, cultural communication and influence, and ethical decision making. Course work will include extensive readings, case studies, written reports, small group projects, presentations and reflections. **Lecture 3, Credits 3 (Fall)**

SOIS-215 **Leadership and Civil Discourse**
Students will examine leadership theory through the lens of civil discourse. Several theories, foundational concepts and current emerging methods to engage in civil discourse from a leadership lens will be explored. Students will compare and analyze current civil discourse practices of leaders and social movements while using investigate civil discourse methods when understanding and managing a specific personal leadership challenge in their own lives. Case studies, reflection exercises and written analysis will serve as the basis of demonstrated learning in this course. **Lecture 3, Credits 3 (Fall, Spring)**

SOIS-216 **Ethics in Leadership**
Students in this course will examine ethical decision making necessary for today's leaders. Ethical theories will be explored in the context of current societal dilemmas facing leaders today. Students will consider the characteristics of ethical leaders via the study of historical figures or fictional characters from literature. Case studies, reflection exercises and written analysis serve as the basis of demonstrated learning in this course. Students in this course will participate in an experiential activity to observe and analyze a group dialogue on a current ethical debate in their community. **Lecture 3, Credits 3 (Fall, Spring)**

SOIS-217 **Leadership and Community Organizing**
Fulfilling the democratic promise of equity, accountability and effectiveness requires the participation of an "organized" citizenry able to formulate, articulate, and assert its shared interests effectively. Organizing, in turn, requires leadership: accepting responsibility for enabling others to achieve shared purpose in the face of uncertainty. Last revised 3/25/16 2 Organizers identify, recruit, and develop leadership; build community around that leadership; and build power from the resources of that community. In this course, students will study leadership through the lens of community organizing in order to develop the critical knowledge and skills necessary to work in teams to achieve specific outcomes in the pursuit of a shared purpose. Students will "practice" leadership by developing a strategy and producing artifacts to mobilize members of a constituency to work together to achieve specific outcomes in pursuit of a shared purpose culminating in the submission of a capstone portfolio that chronicles their work. **Lecture 3, Credits 3 (Fall, Spring)**

SOIS-233 **Teams and Team Development**
This course focuses on the development of the essential skills needed to be an effective team member and understand the characteristics of high-performing teams in the workplace. Students develop a strong framework for building effective teams through topics that include group and team theory research, individual behavior styles and their functions in a team and team leadership, evaluation of team effectiveness, and understanding of negotiation, persuasion and conflict resolution. This course is highly interactive, with projects that require the student to participate in a team to evaluate cross-functional work teams, self-directed teams, and integrated work teams. Learning takes place through lectures, case studies, simulations, and group projects that develop strategies to build strong teams. **Lecture 3, Credits 3 (Spring)**

SOIS-235 **Contemporary Science: Physics**
An introduction to the fundamental principles of physics for non-science majors, and the application of these concepts to areas of interest and concern in our contemporary technological society. The conceptual basis for the phenomena of heat, light, sound, mechanics, electricity and magnetism is discussed and related to such topics as astronomy, space exploration, lasers, and environmental concerns. This course includes an online lab component. **Lecture 3, Credits 3 (Fall, Spring)**

SOIS-240**The Harmonica and the Blues**

From the mid-1800s to today, the harmonica has largely been learned informally, passed down by generations of musicians who have used it to play melodies, solos, and chord accompaniment. It was a natural for the blues because of its human voice-like quality and flexible way to play “blue” notes. Blues musicians developed a harmonica style that reverberates in many musical styles today. This interdisciplinary course focuses on the history and culture of the harmonica and the blues. Students learn about era-related harmonica styles, influential harmonica players, the basics of playing blues-style diatonic harmonica, and the fundamentals of sound. Students will attend a live music performance in the Rochester community. (This class is restricted to undergraduate students with at least 2nd year standing.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

SOIS-244**American Lives, American Values**

This course introduces students to American cultural studies through an interdisciplinary exploration of the ideals, struggles, and themes prominent in representation of iconic American lives and values, from the revolutionary era to the present. Focusing on ideals and concepts such as social justice, immigration, citizenship, and entrepreneurialism, students will learn to critically reflect upon a variety of media, including art, comics, film, literature, and historical documents, that represent American lives and values. **Lecture 3, Credits 3 (Fall, Spring)**

SOIS-298**Independent Study**

Independent study. **Ind Study 3, Credits 1 - 3 (Fall, Spring, Summer)**

SOIS-299**Special Topics**

Special topics are experimental courses offered per semester. **Lecture 3, Credits 1 - 4 (Fall, Spring, Summer)**

SOIS-300**Community Development: Alternative Spring Break**

The traditional model for alternative spring break trips and community service in general tends to focus on what needs to be “fixed” or what is “broken” within a community; what is missing rather than what exists. Seeing the limitations in this traditional type of service John Kretzmann and John McKnight developed Asset-Based Community Development. Last revised 3/25/16 2 This model changes the way we view the communities we serve. Rather than focusing on the needs and deficiencies of a neighborhood, the ABCD approach allows us to look deeper into a community’s assets. In this project driven and experiential learning course, students will challenge traditional service models, learning how to creatively and effectively work with communities to construct relationships that result in sustainable change. Students will bring these practices to life as they work alongside local and global communities on their Alternative Spring Break trips, through Capacity Inventories and Appreciative-Inquiry. Leaving students with an understanding of their own assets and how they can continue to be agents of change in the future. **Lecture 3, Credits 3 (Spring)**

SOIS-325**Business Communication**

This course focuses on the development of communication skills essential to functioning effectively in the business world. Students learn the process of analyzing communication situations and responding to them. Topics include an overview of business communication, writing well, delivering business communications, tools for talking in crucial conversations, oral and interpersonal communication including listening skills, public speaking, cross-cultural communication, communicating in the digital age and teamwork. *Note: This course cannot be taken by students in Saunders College of Business.* (This class is restricted to undergraduate students with at least 2nd year standing. Saunders College of Business students are not permitted to take this course.) **Lecture 3, Credits 3 (Fall, Spring)**

SOIS-326**Technical Writing and Editing**

Introduces students to reports, proposals, instructions, and other documents employed in the contemporary technical workplace and develops the skills needed to create them successfully. Includes adapting content and language for audience and purpose and integrating visuals to support and enhance communication. Editing projects build skill in evaluating writing strategies and effectiveness. The various roles, as well as the ethics, of technical communication in the modern technical are covered. **Lecture 3, Credits 3 (Fall, Spring)**

SOIS-333**Wicked Problems**

This course will expose students to approaching and working on wicked problems - unstructured, multidisciplinary issues lacking clear right or wrong answers. The course will introduce key skills for handling unstructured problems such as whole systems thinking, estimation and assumptions, valuation, and problem solving techniques, with the majority of the semester focused on a specific topic (wicked problem) and team case study. Students will work in teams to research and address one aspect or subset of the wicked problem at hand to join collectively with the results of all teams to form a more complete overall solution to the wicked problem. (This class is restricted to undergraduate students with at least 3rd year standing.) **Lecture 4, Credits 3 (Fall, Spring)**

SOIS-335**Global Forces and Trends**

This course focuses on the understanding of the global forces and trends that impact countries, organizations, and people across many dimensions. Student will learn concepts about global issues and examine the financial, cultural, political, environmental, military, technical, economic and demographic trends and forces affecting today’s and tomorrow’s organizations. Students learn to use critical thinking, analytical, and problem solving skills to envision the future and challenge thinking patterns. Readings, discussions, written assignments, and tests are part of the class. **Lecture 3, Credits 3 (Fall)**

SOIS-340**3D-Technologies for Prosthetic Applications**

3D-technologies offer exciting potential to address the needs of individuals with amputations across the globe. Developing solutions to complex real-world problems requires the cooperative expertise of several disciplines. Students will get hands-on experience with 3D-printers, scanners and software, and discover strategies for applying their academic skills within an interdisciplinary environment. Person-centered design, medical device policy, mechanical properties of materials and life cycle analyses will be examined. Physiological challenges of fitting devices that interface with the body and the benefits and dangers of open-source designs will be explored. Critical thinking will be applied to determine what makes a prosthetic “better” or “worse” within complex environmental and cultural contexts. Psychological ramifications of limb loss and the meaning of wearing a prosthetic will be considered. At what point does it cease to be a device and begin to become a part of the individual? (A minimum of 3rd year standing is required to enroll.) **Lec/Lab 45, Credits 3 (Fall, Spring)**

SOIS-341**Harmonica Seminar**

The harmonica is played in a wide range of musical styles including rock, country, folk/traditional, hip hop, jazz, classical and blues. Students examine the playing styles of leading harmonica players in multiple music genres. These include Larry Adler, Toots Thielemans, John Popper, Stevie Wonder and Little Walter Jacobs. They also research and examine genres they bring to the class. Students enhance their own harmonica playing in this class. Playing with other musicians, using equipment, maintaining and improving harmonicas and the future of the harmonica are also part of the class. (Prerequisite: SOIS-240 or equivalent course.) **Seminar 3, Credits 3 (Fall, Spring)**

SOIS-350**The Meaning of Things - in Three Objects**

Students will study three objects (or categories of objects) through interdisciplinary consideration of their design, history, social and cultural impact. Key learning outcomes are not just knowledge of the objects being studied; they also involve the ability to integrate different ways of knowing and applying that to the objects in terms of their broader social and historical contexts, their consequences for and impact on human experience, as well as the design problems they pose and solve. Each student will think about how his or her own chosen profession involves either the production of an object or the practice of a profession. In this sense, The Meaning of Things encourages critical entrepreneurship, that is, entrepreneurship that is reflective about its social, cultural, and historical debts to the past and to other cultures and societies. The course is team-taught by a group of at least three faculty from across RIT. (Prerequisite: UWRT-150 or equivalent course and permission of instructor.) **Lec/Lab 9, Credits 9 (Spring)**

SOIS-411**The Practice of Innovation and Invention**

This course comprehensively examines how innovation translates new ideas or inventions into practical use in the form of products, markets or services, concepts or systems. The practice of innovation requires understanding different innovation paradigms; the role of creativity, discovery and invention; entrepreneurialism as an implementation strategy; intellectual property issues; team building and collaboration; and experience. Selected case studies and exemplary problems are explored to illustrate the principles and to acquire the skills of innovation. (Prerequisite: CMDS-211 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

SOIS-431**Understanding Organizational Culture**

Organizational culture exists in all kinds of organizations including profit-seeking firms, non-profit organizations and government agencies. It is a primary determinant for how well employees function together and like working in the place they do. Ultimately organizational effectiveness and success depends on a healthy organizational culture. This course introduces organizational culture and methods of analyzing it. The course takes an interdisciplinary functionalist view of organizational culture and subcultures as being: (a) things observed, felt, heard and expressed by employees; (b) organizational values espoused in mission statements, goals, ideals, norms, standards, and moral principles; and (c) underlying assumptions of employees about their roles, responsibilities and relationships given available resources relative to client/constituency performance expectations, applicable labor-management agreements and regulatory/safety compliance issues. Methods for analyzing the health of organizational culture and subcultures are related to various kinds of circumstances faced by firms, organizations and agencies. (This class is restricted to undergraduate students with at least 3rd year standing.) **Lecture 3, Credits 3 (Fall)**

School of Individualized Study

SOIS-432

Managing Organizational Change

Sooner or later all organizations change in certain to many respects and for several reasons. This is true for organizations in profit, non-profit and government sectors which all have many things common. Ongoing organizational success frequently depends on how well change is managed given new opportunities, challenges or threats faced by organizations. Managing organizational change requires knowledge of things in an organization that may need to be changed including an organization's mission, goals, fiscal health, budget, operations and/or production/service capabilities, facilities, unit structure, personnel, culture, technology and other resources. Effective management of organizational change also requires knowledge of and skills in ways to introduce, guide, support, monitor and evaluate changes once they are implemented. This course takes an interdisciplinary applied approach to managing organizational change teaching SOAR-based strategic planning, SWOT analysis, total quality management (TQM) and continuous quality improvement (CQI) among other change models and methods. (This class is restricted to undergraduate students with at least 3rd year standing.) **Lecture 3, Credits 3 (Spring)**

SOIS-441

Creative Critical Thinking and Problem Solving

An interdisciplinary approach to the generation and evaluation of ideas and solutions. Includes analysis of the conditions limiting creativity and the development of a toolkit of strategies and techniques for discovering, inventing and assessing new, unique and useful ideas, applications and solutions. Applicable to a range of life and work situations, from complex environmental concerns to competitive business challenges to family disputes. **Lecture 3, Credits 3 (Spring, Summer)**

SOIS-442

Learning Organization

This interdisciplinary course focuses on theory and techniques for building and sustaining an efficient, creative organization that promotes problem solving and collaborative learning. Learning organization principles of systems thinking, personal mastery, mental models, shared vision, and team learning are studied. Included is an analysis of the conditions limiting an organization's capacity to learn and remediation of organizational learning disabilities. **Lecture 3, Credits 3 (Fall, Spring)**

SOIS-444

Comics in the Archive

This is a course on archiving and analyzing comic books. Using the Cary Collection's archive of comic books, we will work to create a digital finding aid that details the unique print characteristics of comic books. We will also work with digitized copies of comics from the archive, to produce innovative accounts of comics as a print and visual medium. **Lecture 3, Credits 3 (Spring)**

SOIS-461

Leading in a Global Environment

The ability to communicate successfully, demonstrate leadership and navigate cultural complexities rank among the most critical competencies for professionals who work in global environment. In this course, students will explore the impact of globalization, both positive and negative. In addition, they will examine the process of adapting to a new culture and will develop skills for interacting successfully across culture. By looking closely at their own and others values, perspectives and decision-making processes, students will have an opportunity to consider how differing approaches can benefit idea generation, communication and problem solving. The course will also introduce them to the traits that successful global leaders possess, which students will then apply to a variety of situations, including conflict resolution, as well as to other current topics that are of concern in the global arena. **Lecture 3, Credits 3 (Spring)**

SOIS-497

Special Topics

Special topics are experimental courses offered per semester. See course catalog for current titles. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

SOIS-498

Independent Study

Independent study. (This class is restricted to undergraduate students with at least 3rd year standing.) **Ind Study 3, Credits 1 - 6 (Fall, Spring, Summer)**

SOIS-499

Co-op Applied Arts and Science

One semester or summer block of paid work experience in a position commensurate with the student's approved plan of study. **CO OP, Credits 0 (Fall, Spring, Summer)**

SOIS-500

Senior Capstone

This course focuses on a project that demonstrates how the student's multidisciplinary plan of study has prepared him/her for future academic and career activities. Students will integrate their multidisciplinary concentrations through a capstone project and supplementary exercises. The student will execute his/her identified project and prepare the finished project for public presentation and review by an approved Client or Subject Matter Expert, SME. Additional emphasis will be placed on the acquisition of networking and similar professional skills such as interviewing techniques, research techniques, and making use of academic, business, and personal networks. (This class is restricted to degree seeking students with at least 4th year level.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

SOIS-510

Multidisciplinary Life

A capstone class for students in the applied arts and sciences bachelor of science degree program. Course provides students an opportunity to reflect upon and enhance the many aspects of their individualized educational programs and focus on future goals. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

SOIS-511

Innovation Lab

This course builds on the skills and knowledge gained in CMDS-211 Exploring Innovation and CMDS-411 The Practice of Innovation and Invention. In the course students engage as members of an interdisciplinary project team exploring a complex, non-trivial problem for which an innovation in science, technology, design, business, artistic expression, etc., could be significant for working toward a resolution of the problem. Problems may be proposed by students or by faculty mentors, or derived from external sources. After selecting a problem, each team works throughout the semester designing a solution, culminating in a formal written report and oral presentation at the conclusion of the project. (Prerequisite: CMDS-411 or equivalent course.) **Lec/Lab 4, Credits 4 (Fall, Spring)**

SOIS-514

Proposal Writing

Proposal Writing focuses on the elements of proposal responses and practicing creating those elements. Students learn the process of evaluating and responding to RFIs and RFPs with concentration on making bid decisions, organizing teams, identifying strategies, establishing credibility, ensuring technical clarity, and writing persuasively. Topics include the proposal process that is practiced by government, industry, and grant-funding agencies. Co-listed with TCOM-621. **Lecture 3, Credits 3 (Fall)**

SOIS-542

Art Comics

This course will explore how the comics medium has figured into the history of modern and contemporary art, visual culture, and literary culture. Students will explore how cartooning, drawing, and printmaking in the 19th century led to the development of early comics and the newspaper comic strip, how early 20th century comics fit into the modernist avant-garde, how postwar artists began to use the comics medium as both source material and as a medium unto itself, how comics have been incorporated into contemporary art museums and galleries, and how contemporary comics artists engage with abstraction, medium specificity, seriality, and the archive. The course will draw from an interdisciplinary range of methodologies, from art history and visual culture to literary studies and museum studies. **Lecture 3, Credits 3 (Fall)**

SOIS-544

Science Writing

Course introduces students to the writing process for describing scientific and technological subject matter for presentation to general audiences. Students will learn to gather needed source material and organize, write and edit articles that cover developments in the scientific and technological communities. Various article formats used in professional, in-house, trade, and popular publications are presented. *Note: This course is cross-listed with TCOM-614. Students cannot receive credit for both 544 and 614. * **Lecture 3, Credits 3 (Fall)**

Math and Science

MTSC-234

Contemporary Science: Oceanus

An introduction to the fundamental principles of oceanography for non-science majors and the application of these concepts to areas of compelling interest in our contemporary, technological society. Topics include chemistry, geology, meteorology, physics, ecology, taxonomy, and scientific history, with specific attention to ecology and other contemporary issues. Students apply oceanographic concepts using a laboratory kit. **Lecture 3, Credits 3 (Fall, Spring)**

Quality Management

QLTM-310

Introduction to Quality

This course provides an introduction to the fundamental concepts of quality management. It includes an overview of the competitive environment, the cost of poor quality, and the history of quality; a systematic examination of the leading definitions of quality and models of quality management; and an exploration of the implication of quality management concepts for organizational structure and roles, decision making and interpersonal relations. **Lecture 3, Credits 3 (Fall, Spring)**

QLTM-340

Quality Data Analysis

This course is an introduction to statistics and probability that provides students with techniques to analyze and interpret quality control data. Topics include problem solving techniques such as the fishbone and flowcharting; descriptive statistics (statistical tables and graphs, measures of central tendency and dispersion); hypothesis testing; distributions commonly used in quality management; and one-way ANOVA. **Lecture 3, Credits 3 (Spring)**

QLTM-410**Introduction to Lean Six Sigma**

Six Sigma techniques, introduced to industry in the late 1980's, use data-driven decisions to reduce defects, drive down costs and increase efficiency. This methodology focuses on minimizing process variation, thereby enabling the process to operate more smoothly and efficiently. Lean is a process that focuses on eliminating waste and streamlining operations. Lean Six Sigma combines the two processes, providing a powerful tool to make improvements in any process or business. In this course, students learn the history, context, and tools of Lean/Six Sigma and apply the process in a course project. (QLTM-310; QLTM-340; or permission of instructor) (Prerequisite: QLTM-310 or QLTM-340 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

QLTM-420**Statistical Quality Tools**

An introductory course in Statistical Quality Control techniques used in determining operating quality levels and recognizing degrees of process control and capability in a service industry or a manufacturing process. Topics include sources of variation; construction and interpretation of charts for variables and attributes; process capability; acceptance sampling; and design of experiments (DOE) concepts. (Prerequisite: QLTM-340 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

QLTM-430**Management for Quality**

Successful companies integrate quality techniques and concepts throughout their operations. This course addresses issues in developing and managing an effective organization, including defining a quality philosophy, delighting the customer, the role of strategic planning, enhancing the employee involvement, and sustaining quality initiatives. Additional topics include evaluating quality standards and systems, benchmarking, and vendor and supplier assurance. **Lecture 3, Credits 3 (Spring)**

QLTM-480**Introduction to Asset Management**

Unscheduled downtime costs businesses millions of dollars each year, but asset management and maintenance is often the last area to attract the attention of managers trying to lower costs. Usually thought of as non-value-added, maintenance and asset management policies can have significant impact on a company's profit. This course introduces the student to the wide range of policies and practices, including capital budget issues related to asset acquisition, cost of ownership, and depreciation; inventory/procurement; maintenance policies such as run-to-failure, preventive maintenance, and reliability centered maintenance; training issues; and developing performance indicators for asset management programs. (Prerequisite: QLTM-340 or STAT-145 or MTSC-211 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

Technical Communication

TCOM-270**Effective Web Design I**

This course introduces students to the fundamentals of static web design using xhtml, style sheets, and web graphics. After completing this course students will be able to comprehend appropriate application of manual code, gather and organize web content, construct their own xhtml, analyze markup language, critique existing site designs, and use CSS, frames, tables, slices, and FTP to solve spatial, visual, and data problems. Students will utilize Adobe Dreamweaver, or other web development software, and will learn the basic techniques, tools, and processes used to construct a well-designed and effective web site while keeping the site's users in mind. **Lecture 3, Credits 3 (Fall)**

TCOM-271**Effective Web Design II**

This course introduces students to user-centered web graphics and design, with an emphasis on dynamic web development. Students will learn to integrate imperatives of user-centered interface with principles of aesthetic design, to bring effective information architecture to the digital landscape. Current topics in web development, such as XHTML, ActionScript, XML, PHP, ColdFusion, and JavaScript will be discussed. Students will demonstrate proficiency in Adobe Flash, or other current web development software, through the creation of animated graphics and web content. **Lecture 3, Credits 3 (Spring)**

TCOM-320**Professional Presentations**

People who are able to effectively present information to an audience are more likely to be successful in their careers. In this course, students learn to develop and present information to a variety of audiences. The course focuses on targeting specific audiences, using the beauty of language in writing speeches and other types of presentations, applying delivery techniques, using media, and overcoming the fear of public speaking. **Lecture 3, Credits 3 (Spring)**

TCOM-356**Strategic Communications**

This course uses a case study approach to introduce students to the techniques and process needed to solve organizational communication problems. Students study and analyze a variety of cases wherein strategic communication played critical roles and develop skill in planning effective communication plans and campaigns. **Lecture 3, Credits 3 (Spring)**

TCOM-361**Research Techniques**

This course offers exposure to and experience with electronic and traditional resources for information generation. Student assignments include fact-finding assignments and culminate in an extended research project of the student's choice. Students use problem-solving strategies, assess project requirements, collect data, report periodically on their progress, and formally present their results. A variety of research methodologies are introduced, including accessing digital databases, interviewing skills, developing and using questionnaires, and review and use of literature. **Lecture 3, Credits 3 (Fall, Spring)**

TCOM-380**Design for Print and Web**

Students use vector and bit-map imaging software to design a range of graphic projects suited to web and print formats. Projects include photographic imaging, layout, vector editing, digital painting and retouching, typography, internet graphics, and collaboration. Class discussions cover current professional design topics. **Lecture 3, Credits 3 (Spring)**

TCOM-381**Photo Imaging I**

Students will use photographic imaging software to create, combine, and modify graphic imagery. Topics will include retouching, tonal adjustments, custom brushes and pattern, raster text, spatial illusion, masking techniques, animation, and compositing. Students will research and discuss professional design, effective visual communication, copyrights, and photographic illustration. **Lecture 3, Credits 3 (Fall)**

TCOM-382**Photo Imaging II**

Students will use photographic imaging techniques to produce illustrations, web graphics, composited photographic imagery, and corrected photographs. Techniques learned in previous courses will combine to bring new results. Topics include image correction, duotones, channels, photographic illustration, path shapes, concept presentation, digital asset management, and advanced layer techniques. Students will explore and discuss design and professional issues and innovations. Bit-mapped imaging (in Adobe Photoshop) is presented in a hands-on, two-term sequence. **Lecture 3, Credits 3 (Spring)**

TCOM-383**Designing Vector Graphics**

Students will use vector graphic software (Adobe Illustrator) and basic design principles to prepare graphic materials. Students will design illustrations for print, web, devices, and distribution, developing technical skill and design sensibility in creating object-oriented graphics through line and node editing using vector graphic software (Adobe Illustrator.) Students will analyze professional illustration, research trending topics, understand output consequences including color management, and file size efficiency. **Lecture 3, Credits 3 (Spring)**

TCOM-410**Technical Information Design**

Intensive practice in the creation of content for online and multimedia documents with emphasis on the presentation of technical and scientific concepts, products, and processes. A survey of graphic methods for the display of complex technical relationships and ideas. Students will also explore contemporary topics (international technical communication, the future of on-line documentation, ethical considerations in technical information design, etc.) and applications (legal, medical, electronics, environmental, etc.) in technical information design. **Lecture 3, Credits 3 (Spring)**

TCOM-435**Promotional Writing**

This course introduces students to the techniques and approaches needed to create promotional materials used in marketing, sales, publicity and establishing organizational identity. The advantages, uses and guidelines of creating print media applications; including direct mail, catalogs, brochures, and other publicity and identity pieces; website materials; and film and video pieces are presented. Students will create a short script and pieces for print and web distribution. **Lecture 3, Credits 3 (Spring)**

TCOM-476**Instructional Design Principles**

This course presents an overview of the process of designing instructional packages from need and task analysis through identifying goals and objectives, media selection, program development and validation testing. Additional focus is given to managing the development process and making a business cases to justify the cost/value of such projects to decision makers within an organization. (This class is restricted to undergraduate students with at least 3rd year standing.) **Lecture 3, Credits 3 (Fall, Spring)**

Professional Studies

PROF-221**New Venture Development**

This course presents factors to be considered by those interested in the ownership and management of small business enterprises. Includes who should be an entrepreneur, guidelines for starting a new business, basic legal considerations, and approaches for obtaining credit and capital. Revised course includes staffing, purchasing, supplier relations, cash flow management, and managerial skills needed to run any business or corporate department. **Lecture 3, Credits 3 (Fall, Spring)**

PROF-324 Introduction to Logistics and Transportation
The course studies the logistics and transportation industry as part of the growing emphasis on distribution technologies. Introduces basic understandings of the function areas of logistics management and their interrelationships and how transportation and distribution play a significant role in the success of a business. (This class is restricted to undergraduate students with at least 3rd year standing.) **Lecture 3, Credits 3 (Fall, Spring)**

PROF-510 Project Management
This course addresses project management from a multidisciplinary perspective, covering the fundamental nature of and techniques for managing a broad range of projects. Topics cover the Project Management Life Cycle from Planning to Termination. It also addresses the behavioral and quantitative facets of project management, as well as the use of methods, tools and techniques for the initiation, planning, and execution of projects. Introduces the standard framework, processes and knowledge areas of A Guide to the Project Management Body of Knowledge (PMBOK® Guide) as defined by the Project Management Institute (PMI). Project Management is available in on campus and online formats. *Note: BUSI-510 may not be substituted for BUSI-710 in a SOIS graduate concentration or the SOIS advanced certificate in project management. Additionally, a student may not register for and receive credit for both BUSI-510 and BUSI-710, whether taken as an undergraduate or graduate student.* (A minimum of 3rd year standing is required to enroll.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

University Writing Program

UWRT-100 Critical Reading and Writing
Critical Reading and Writing is a one semester, three-credit course limited to 15 students per section. This course is designed to help students develop the literacy practices they will need to be successful in their First-Year Writing course. Students will read, understand, interpret, and synthesize a variety of texts. Assignments are designed to challenge students intellectually, culturally and rhetorically. Through inquiry-based assignment sequences, students will improve their writing by developing academic research and literacy practices that will be further strengthened in First-Year Writing. Particular attention will be given to critical reading, academic writing conventions, and revision. Small class size promotes frequent student-instructor and student-student interaction. The course also emphasizes the principles of intellectual property and academic integrity in academic writing. This course fulfills a Gen Ed free elective. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

UWRT-150 FYW: Writing Seminar
Writing Seminar is a three-credit course limited to 19 students per section. The course is designed to develop first-year students' proficiency in analytical and rhetorical reading and writing, and critical thinking. Students will read, understand, and interpret a variety of non-fiction texts representing different cultural perspectives and/or academic disciplines. These texts are designed to challenge students intellectually and to stimulate their writing for a variety of contexts and purposes. Through inquiry-based assignment sequences, students will develop academic research and literacy practices that will be further strengthened throughout their academic careers. Particular attention will be given to the writing process, including an emphasis on teacher-student conferencing, critical self-assessment, class discussion, peer review, formal and informal writing, research, and revision. Small class size promotes frequent student-instructor and student-student interaction. The course also emphasizes the principles of intellectual property and academic integrity for both current academic and future professional writing. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

UWRT-325 Writing Genre, Theory and Practice
Writing Genre, Theory & Practice is a three-credit course. This course is designed to foster students' development as academic writers and communicators through the study of genre, literacy, and peer-to-peer interactions. Students will read, interpret, and reflect on a variety of texts, analyze writing-related artifacts, revise their own writing in a variety of mediums, and conduct ethnographic-oriented observations of writing consultation sessions in the RIT Writing Commons. Particular attention will be given to the writing and revision process, peer-to-peer conferencing, class discussion, and ethnographic research and remediation projects. Through engagement with each other and students and staff in the Writing Commons, students will develop successful reading, writing, and communication practices that will inform their participation in other academic and workplace contexts (e.g. writing center consultations, undergraduate research). To be enrolled in UWRT 325, students need to have completed UWRT 150 First Year Writing. (Prerequisites: Completion of First Year Writing (FYW) requirement is required prior to enrolling in this class.) **Lecture 3, Credits 3 (Fall, Spring)**

UWRT-365 Writing, Public Speaking and Civic Engagement
Civic engagement describes the different ways individuals and collectives work to identify public concerns, defend or redefine public values, seek to correct historical injustices, and make positive change for the common good or a specific community. In this course, students will gain an understanding of key concepts and vocabulary within interdisciplinary civic engagement and social justice literature, engage a variety of contemporary issues of public concern and the groups that seek to address these issues through different forms of civic engagement, and learn about the role rhetoric plays within these diverse and situated civic contexts. Students will identify a public concern (i.e. homelessness, voting restrictions, health care disparities, environmental racism, economic inequality, the school-to-prison pipeline) they want to learn more about; identify a group or groups seeking to address that issue through practices of civic engagement; and analyze, research, and present on that issue and group through formal and informal writing and public speaking/presentation assignments. Students will learn tools and perspectives in rhetorical analysis and genre awareness, effective writing practices for a college-level humanities course, effective public speaking/presentation skills, and revision and workshoping strategies for both writing and presentation contexts. **Lecture 3, Credits 3 (Fall, Spring)**

National Technical Institute for the Deaf

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Course numbering: RIT courses are generally referred to by their alphanumeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100-299), upper division (300-599), or graduate level (600 and above).

Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.

American Sign Language and Interpreting Education

American Sign Language-Evening Courses

ASLC-211 Introduction to American Sign Language and Deaf Culture I
Students are introduced to approximately 300 basic conversational signs and linguistic features needed to engage in survival-level conversations with Deaf people. Fingerspelling and background information on Deaf culture and community are included. Each class period will have small group, large group and pair interactions. **Lecture 2, Credits 2 (Fall, Spring)**

ASLC-212 Introduction to American Sign Language and Deaf Culture II
This course continues the development of American Sign Language skills for students who have successfully completed Introduction to American Sign Language and Deaf Culture I. The course focuses on ASL vocabulary, linguistic features, and cultural protocols to enable students to function in survival level ASL conversations with a focus on work-related and social communication. Students learn to talk about when activities occur, make requests, and discuss weather conditions, daily routines, and health. (Prerequisites: ASLC-211 or equivalent course.) **Lecture 2, Credits 2 (Fall, Spring)**

ASLC-289 Special Topics: American Sign Language and Deaf Culture
The description for the special topics course will be specified in each course proposal. **Lecture, Credits 1 - 3 (Fall, Spring)**

ASL-English Interpretation

INTP-120 American Sign Language I
ASL I includes linguistic features, cultural protocols and core vocabulary for students to function in basic ASL conversations that include ASL grammar for asking and answering questions while introducing oneself, exchanging personal information, talking about family, friends and surroundings, and discussing activities. This course is designed for students who have no knowledge of American Sign Language. To progress to the next ASL course in the series (INTP-125), students must complete the course with a minimum grade of C. (This course is restricted to ASLINT-BS Major students.) **Lec/Lab 5, Credits 4 (Fall)**

INTP-125 American Sign Language II
In this course, students will develop ASL receptive and expressive skills needed to converse about familiar topics using series of discrete sentences. At the end of the semester, students will achieve effective communication by using vocabulary, grammar, and cultural protocols at a Novice-High level as defined by the American Council on the Teaching of Foreign Languages. Activities include delivering monologues and lab exercises that provide extensive hands-on practice using a variety of media. Students are expected to engage with members of the Deaf community in order to learn about Deaf co-culture in the United States. (Prerequisites: MLAS-201 or equivalent course with a minimum grade of C and undergraduate standing in ASLINT-BS.) **Lec/Lab 5, Credits 4 (Fall)**

INTP-126 American Sign Language III
In this course, students will develop ASL receptive and expressive skills needed to communicate discrete paragraphs composed of connected sentences. At the end of semester, students will achieve effective communication by using vocabulary, grammar, and cultural protocols for conveying details about familiar topics at an Intermediate-Low level as defined by the American Council on the Teaching of Foreign Languages. Activities include delivering presentations and lab exercises that provide extensive hands-on practice using a variety of media. Students are expected to engage with members of the Deaf community in order to learn about Deaf co-culture in the United States. (Prerequisites: INTP-125 with a C or better or equivalent course and undergraduate standing in ASLINT-BS.) **Lec/Lab 5, Credits 4 (Spring)**

INTP-150 Foundations of ASL
This course is designed to develop conversational discourse and presentation skills in American Sign Language (ASL). It provides students with the foundational knowledge necessary to engage in ASL discourse in basic presentations, dialogues, and group settings. Students will expand their knowledge of ASL vocabulary and linguistic features; identify main ideas, supporting details, and transitions in ASL discourse; improve their ASL comprehension and expression; apply cultural interaction behaviors appropriate to given settings; deliver short presentations in ASL; and learn how to assess their ASL abilities and develop an ASL personal improvement plan. (Prerequisites: INTP-125 with a C or better or equivalent course and undergraduate standing in ASLINT-BS.) **Lec/Lab 5, Credits 4 (Fall)**

INTP-200 Deaf Expressions
Students will explore the historical, philosophical, linguistic, social, cultural, educational, medical and artistic past, present, and future of deaf/Deaf/hard-of-hearing people. This course uses an online format to discuss concepts and perspectives found in the assigned book(s) and visual media (e.g. film, television programs, etc.). Each time the course is offered the book and visual media will be different so students may take this course multiple times. Books/media will be chosen from areas with relevance to Deaf Culture and community, such as D/deaf literature and the Arts, D/deaf history, D/deaf issues, significant D/deaf people, and ASL. This course is repeatable for credit. (This course is restricted to ASLINT-BS Major students.) **Lecture 2, Credits 1 (Fall, Spring)**

INTP-210 Introduction to the Field of Interpreting
This survey course provides an introduction to the profession of sign language interpreting. Course content includes an overview of the history of the profession and professional organizations, interpreter role metaphors, the philosophy of practice within the field, and various work settings and protocols. Additionally, demand control schema is introduced as a critical analysis framework to uphold the values which serve the Deaf community and the linguistic and cultural values established in the field. (This course is restricted to ASLINT-BS Major students.) **Lecture 3, Credits 3 (Fall)**

- INTP-215** **Processing Skills Development**
The act of interpretation is a complex cognitive challenge. Isolating and mastering specific subtasks of the interpreting process is critical for the synthesis of these subskills in the process of translation and interpretation. This course is an introduction to the cognitive processing skills necessary for translation, consecutive interpretation, and simultaneous interpretation. The course includes an overview of theoretical models of translation and interpretation, the development of basic processing subskills that provide a foundation for translation and interpretation, and practice activities for the integration of these tasks in an 8-step discourse analysis process for translation and consecutive interpreting. Course content includes interpreting and translation theory, message analysis, visualization, shadowing, paraphrasing, dual task training, and text analysis. (Prerequisites: INTP-225 and INTP-210 or equivalent courses with a minimum grade of C and undergraduate standing in ASLINT-BS.) **Lecture 3, Credits 3 (Spring)**
- INTP-225** **American Sign Language IV**
In this course, students will develop ASL receptive and expressive skills needed to communicate discrete paragraphs using complex connected sentences. At the end of the semester, students will achieve effective communication by using vocabulary, grammar, and cultural protocols for conveying details about less familiar topics at an Intermediate-Mid level as defined by the American Council on the Teaching of Foreign Languages. Activities include delivering presentations and lab exercises that provide extensive hands-on practice using a variety of media. Students are expected to engage with members of the Deaf community in order to learn about Deaf co-culture in the United States. (Prerequisites: INTP-126 or equivalent course with a minimum grade of C and undergraduate standing in ASLINT-BS.) **Lec/Lab 4, Credits 3 (Fall)**
- INTP-226** **American Sign Language V**
In this course, students will develop ASL receptive and expressive skills needed to communicate series of connected paragraphs using complex connected sentences. At the end of the semester, students will achieve effective communication by using vocabulary, grammar, and cultural protocols for conveying details about less familiar topics at an Intermediate-High level as defined by the American Council on the Teaching of Foreign Languages. Activities include delivering presentations and lab exercises that provide extensive hands-on practice using a variety of media. Students are expected to engage with members of the Deaf community in order to learn about Deaf co-culture in the United States. (Prerequisites: INTP-225 or equivalent course with a minimum grade of C and undergraduate standing in ASLINT-BS.) **Lec/Lab 4, Credits 3 (Spring)**
- INTP-310** **Interpreting I**
This course introduces the English-to-ASL and ASL-to-English interpreting process with a focus on text analysis and consecutive production of an equivalent target language message. Compression and expansion strategies are introduced. Students develop interpreting management strategies and diagnostic assessment skills. Students interpret monologic and dialogic inquiry and narrative text formats while learning the interpretation process. Students also learn and integrate the features of biomechanics for interpreters to practice safe work habits. (Prerequisites: INTP-215 and INTP-226 or equivalent courses with a minimum grade of C.) **Lecture 3, Credits 3 (Fall)**
- INTP-315** **Practical and Ethical Applications**
This course presents the underlying principles of the Registry of Interpreters for the Deaf Code of Professional Conduct and other ethical content material, including the four core principles of service professions and how these principles apply to practice settings. This course exposes students to actual interpreting jobs and practitioners, providing students an opportunity to explore how professional interpreters weigh and balance these principles in their daily work and how Deaf and hearing consumers perceive interpreters' decision-making skills. The course also addresses the distinction between normative and descriptive ethics and their impact on interpreters' decision-making. Students will have the opportunity to explore reflective practice techniques as a means to develop ethical judgment skills, to gain critical insight into the task of self-regulation, and as a technique to engage in self-care. The ethical constructs of demand control schema will be used as the framework for decision making. Etiquette and protocols specific to each setting will be discussed. Settings include: K-12, post-secondary, religious, healthcare, mental health, DeafBlind, performing arts, legal, VRS, VRI, and business and industry. (Prerequisites: INTP-210 or equivalent course and undergraduate standing in ASLINT-BS.) **Lab 2, Credits 3 (Fall)**
- INTP-315** **Practical and Ethical Applications**
This course presents the underlying principles of the Registry of Interpreters for the Deaf Code of Professional Conduct and other ethical content material, including the four core principles of service professions and how these principles apply to practice settings. This course exposes students to actual interpreting jobs and practitioners, providing students an opportunity to explore how professional interpreters weigh and balance these principles in their daily work and how Deaf and hearing consumers perceive interpreters' decision-making skills. The course also addresses the distinction between normative and descriptive ethics and their impact on interpreters' decision-making. Students will have the opportunity to explore reflective practice techniques as a means to develop ethical judgment skills, to gain critical insight into the task of self-regulation, and as a technique to engage in self-care. The ethical constructs of demand control schema will be used as the framework for decision making. Etiquette and protocols specific to each setting will be discussed. Settings include: K-12, post-secondary, religious, healthcare, mental health, DeafBlind, performing arts, legal, VRS, VRI, and business and industry. (Prerequisites: INTP-210 or equivalent course and undergraduate standing in ASLINT-BS.) **Lecture 2, Credits 3 (Fall)**
- INTP-325** **American Sign Language VI**
In this course, students will develop ASL skills needed to create narratives composed of an introduction, main points, supporting points, transitions, and a closing. At the end of the semester, students will achieve effective communication by using vocabulary, grammar, translation skills, and cultural protocols for conveying details about unfamiliar topics at an Advanced-Low level as defined by the American Council on the Teaching of Foreign Languages. Activities include delivering presentations, storytelling, and lab exercises that provide extensive hands-on practice using a variety of media. Students are expected to engage with members of the Deaf community in order to learn about Deaf co-culture in the United States. (Prerequisites: INTP-226 or equivalent course with a minimum grade of C or better and undergraduate standing in ASLINT-BS.) **Lec/Lab 4, Credits 3 (Fall)**
- INTP-326** **American Sign Language VII**
In this course, students will develop ASL skills needed to create complex narratives composed of an introduction, main points, supporting points, transitions, and a closing. At the end of the semester, students will achieve effective communication by using grammar, translation skills, and cultural protocols for conveying details about abstract concepts at an Advanced-Mid level as defined by the American Council on the Teaching of Foreign Languages. Activities include delivering presentations, storytelling, and lab exercises that provide extensive hands-on practice using a variety of media. Students are expected to engage with members of the Deaf community in order to learn about Deaf co-culture in the United States. (Prerequisites: INTP-325 or equivalent course with a minimum grade of C and undergraduate standing in ASLINT-BS.) **Lec/Lab 4, Credits 3 (Spring)**
- INTP-335** **Interpreting II: English to ASL**
Students will develop the ability to produce an equivalent simultaneous ASL message from an English source message. This course integrates inquiry and expository texts in both dialogic and monologic formats. Specific discipline areas include interpreting in healthcare, employment, and finance settings. Within those discipline areas, students will have the opportunity to interpret in authentic environments with both Deaf and hearing consumers. Students will continue to develop text analysis skills, applying them to translating and simultaneous interpreting. Students are exposed to self-employment business practices within the interpreting field. Biomechanics and self-care issues will continue to be discussed. (Prerequisites: INTP-310 and INTP-325 or equivalent course with a minimum grade of C and undergraduate standing in ASLINT-BS.) **Lecture 3, Credits 3 (Spring)**
- INTP-336** **Interpreting II: ASL to English**
Students will develop the ability to produce an equivalent simultaneous English message from an ASL source message. This course integrates inquiry and expository texts in both dialogic and monologic formats. Specific discipline areas include interpreting in healthcare, employment, and finance settings. Within those discipline areas, students will have the opportunity to experience interpreting in authentic environments with both Deaf and hearing consumers. Students will continue to develop text analysis skills, applying them to translating and simultaneous interpreting. Additionally, students will develop the ability to apply the principles of diagnostic feedback. (Prerequisites: INTP-310 and INTP-325 or equivalent course with a minimum grade of C and undergraduate standing in ASLINT-BS.) **Lecture 3, Credits 3 (Spring)**
- INTP-340** **Interpreting Frozen and Literary Texts**
This course will focus on skills and techniques for the interpretation of frozen and literary texts. Work includes translation and interpretation between English and ASL. Source English texts used in this course are the: National Anthems of USA and Canada; Lord's Prayer; Pledge of Allegiance; children's songs and poetry; patriotic songs; religious songs and prayer; AA 12 steps and 12 traditions; holiday songs; and selected poetry. (Prerequisites: (INTP-310 or (0875-315 and 0875-316)) or equivalent course and undergraduate standing in ASLINT-BS.) **Lec/Lab 3, Credits 3 (Spring)**

INTP-350**Practicum and Seminar I**

This course combines an introductory practicum experience in the field of ASL-English interpretation with a seminar component to allow senior-level students to engage in reflective practice as they transition into the interpreting profession. Students will undertake field experiences that provide them with firsthand knowledge and familiarity with current topics that impact professional sign language interpreters and the Deaf community. Practicum will also give students the opportunity to gain firsthand experience under the immediate supervision of a professional interpreter, who functions as each student's mentor. The practicum experience will involve activities such as observing a mentor and other interpreters at work; interpreting under the supervision of a mentor; and weekly meetings with a mentor to discuss the practicum experience and to receive professional feedback. Building upon students' practicum experiences, students will use the constructs of Demand Control Schema to guide their seminar discussions. Students will meet together weekly with their classmates to share observations and experiences gained from the practicum placement. Seminar topics derived from students' field experience will focus on language issues in interpretation, ethical decision making, application of the Code of Professional Conduct, making interpretation choices, and implementing successful business practices as a professional interpreter. Students must complete a minimum of 100 hours of field experience and related activities. (Prerequisites: INTP-315 and INTP-335 and INTP-336 or equivalent courses with a minimum grade of C. This course is restricted to students with at least a 2.5 cumulative GPA.) **Seminar 2, Credits 3 (Fall, Spring)**

INTP-355**Introduction to Working with the Deaf Blind Community**

This course is an introduction to various perspectives of the Deaf-Blind community. The focus of the course will be on the variety of communication modes and cultural norms that are discovered within the Deaf-Blind community. Students will be able to develop an understanding of the role/function of a Support Service Provider through hands-on experience and interaction with Deaf-Blind individuals. (Prerequisites: This class is restricted to at least 3rd year standing in ASLINT-BS or NTID supported students and INTP-226 or MLAS-401 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

INTP-360**Introduction to K-12 Interpreting**

This course includes an overview of the history and current status of educational interpreting throughout the United States. Content includes the role, practices, and skills of educational interpreters in K-12 settings; communication systems; pertinent laws and regulations; resources, information, and strategies for consumer awareness and education; administrative practices and personnel structure of school systems; assessment and management of educational interpreters; and topics that concern educational interpreters. (ASLINT-BS YR 3 or 4) **Lecture 3, Credits 3 (Fall)**

INTP-361**Educational Interpreting: Elementary Settings**

This course is designed to prepare students to interpret in elementary school settings. Content will include an orientation to activities, elementary level content, sign vocabulary, language development, psycho-social development, and interpreting issues that are pertinent to elementary students. The course addresses strategies for interpreting classroom discourse and various content areas. Vocabulary for various elementary content areas will be introduced. Students will simultaneously interpret English-to-ASL and ASL-to-English, elementary-level texts. (Prerequisites: INTP-310 and INTP-360 or equivalent course and undergraduate standing in ASLINT-BS.) **Lecture 3, Credits 3 (Spring)**

INTP-362**Educational Interpreting: Middle/Secondary Settings**

This course is designed to prepare students to interpret in middle and secondary school settings. Content will include orientation to the activities, middle/secondary school curriculum, sign vocabulary, language development, psycho-social development and issues pertinent to middle and secondary school students. The course also includes information about teaching methodologies and strategies for interpreting classroom discourse and various content areas. Students will learn how to prepare the middle/secondary students to request and work with interpreters. Vocabulary for various middle and secondary school content areas will be introduced. Students will also learn about interpreting for foreign language courses. Students will simultaneously interpret English-to-ASL and ASL-to-English, middle and secondary level texts. (Prerequisites: INTP-310 and INTP-360 or equivalent course and undergraduate standing in ASLINT-BS.) **Lecture 3, Credits 3 (Spring)**

INTP-363**Educational Interpreting: Post Secondary Settings**

This course prepares students to interpret in the post-secondary setting. Students will learn preparation strategies for English-to-ASL and ASL-to-English interpreting for the following topics: computer science, advanced science and mathematics, selected liberal arts, physical education, and the instruction of a foreign language. In addition, students will become familiar with current issues facing interpreters in post-secondary settings. As part of this course, students will observe interpreters working in several types of college classrooms, (e.g. lectures, seminars, labs, and studios). (Prerequisites: (INTP-435 and INTP-436) or 0875-400 or equivalent course and undergraduate standing in ASLINT-BS.) **Lecture 3, Credits 3 (Spring)**

INTP-371**Introduction to Cued American English**

This course is an introduction to the Cued Speech system of representing spoken American English, its history, and application. Students will increase their awareness of spoken English and the pronunciation of words in conversation. They will also understand and describe the purpose of Cued Speech, as well as identify other populations and uses for Cued Speech. Students will understand the language learning benefits of Cued Speech. Upon completion of the course students will be able to accurately use Cued Speech to convey spoken American English. Students will receive credit for INTP-371 or NCOM-371, not both. (ASLINT-BS YR 3 or 4) **Lecture 3, Credits 3 (Fall)**

INTP-399**Independent Study: ASL-English Interpretation**

The description for each independent study request will be specified in each student proposal. (This course is restricted to ASLINT-BS Major students.) **Lecture, Credits 1 - 3 (Fall, Spring)**

INTP-435**Interpreting III: English to ASL**

In this course, students will advance their skills in simultaneously producing equivalent ASL messages from English source texts. Monologic expository texts on specific topic areas will be the focus of this course. A significant portion of the interpretation work in this course will take place utilizing speakers and audience members in authentic environments. Students will learn to manage the physical setting (logistics) and to select and use appropriate technology when applicable. Students will continue to develop their English and ASL vocabulary and interpreting analysis skills; in addition, they will develop team interpreting skills and increase stamina. (Prerequisites: INTP-335 and INTP-326 or equivalent course with a minimum grade of C and undergraduate standing in ASLINT-BS.) **Lecture 3, Credits 3 (Fall)**

INTP-436**Interpreting III: ASL to English**

In this course students will advance their skills in simultaneously interpreting from ASL to English. Monologues and expository texts on specific topic areas will be the focus of this course. A significant portion of the interpretation work in this course will take place utilizing speakers and audience members in authentic environments. Students will learn to manage the physical setting (logistics) and to select and use appropriate technology when applicable. Students will continue to hone their English and ASL vocabulary and interpretation analysis skills; in addition, they will develop team interpreting skills and increase stamina. (Prerequisites: INTP-336 and INTP-326 or equivalent course with a minimum grade of C and undergraduate standing in ASLINT-BS.) **Lecture 3, Credits 3 (Fall)**

INTP-441**Healthcare Interpreting**

This course is designed to introduce students to sign language interpreting in healthcare settings through the analytical construct of Demand-Control Schema for interpreting work. The course content includes medical terminology in English and ASL. Students will learn tools and techniques to utilize while interpreting in healthcare environments with an emphasis on interactive learning including direct exposure to healthcare settings, deaf and hard-of-hearing healthcare professionals and professional healthcare interpreters. (Prerequisites: INTP-315 or equivalent course with a minimum grade of C or Co-requisite: INTP-315 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

INTP-451**Mental Health Interpreting**

This course is designed to introduce students to the field of mental health interpreting. Students will become familiar with the DSM-IV and common types of mental illness as well as psychiatric terminology in both English and ASL. Students will examine the role, function, ethics, and challenges of interpreting in mental health settings through the analytical construct of Demand-Control Schema for interpreting work. Students will also learn tools and techniques to utilize while interpreting in psychiatric environments and will have opportunities to interact with mental health professionals. (Prerequisites: INTP-315 or equivalent course with a minimum grade of C.) **Lecture 3, Credits 3 (Spring)**

INTP-455**Practicum II**

This course continues the practicum experience for senior-level ASL-English interpretation students that was initiated in the Practicum & Seminar I course. Students will continue to undertake field experiences that provide them with firsthand knowledge and familiarity with current topics and issues that impact professional sign language interpreters and the Deaf community. Students will benefit by gaining firsthand experience, supervision, and feedback from mentors. Students must complete a minimum of 205 hours of field experience and related activities. (Prerequisites: INTP-350 and INTP-435 and INTP-436 or equivalent courses with a minimum grade of C. This course is restricted to students with at least a 2.5 cumulative GPA. Co-requisite: INTP-456 or equivalent course.) **Seminar, Credits 4 (Fall, Spring)**

- INTP-456** **Seminar II**
This course is a culminating seminar experience in which students will engage in reflective practice as they transition into the interpreting profession. Building upon students' practicum experiences, this course provides an opportunity to discuss current topics and issues that impact professional sign language interpreters and the Deaf community. Using the constructs of Demand Control Schema to guide discussions, students will meet together weekly to share observations and experiences gained from the practicum placement. Class topics derived from students' field experience will focus on language issues in interpretation, ethical decision making, application of the Code of Professional Conduct, making interpretation choices, and implementing successful business practices as a professional interpreter. Students will maintain an electronic portfolio showcasing their knowledge and skills learned from the interpreting program. (Prerequisites: INTP-350 and INTP-435 and INTP-436 or equivalent courses with a minimum grade of C. This course is restricted to students with at least a 2.5 cumulative GPA. Co-requisite: INTP-455 or equivalent course.) **Seminar 2, Credits 2 (Fall, Spring)**
- INTP-460** **Issues in Interpreting**
This capstone course offers students an opportunity to integrate content areas in the program curriculum and investigate current issues and controversies in the field of interpreting. The course content and activities will vary depending on current issues, literature developments, and students' interests, but students will be given guiding research tools through research development with a critical approach to interpreting-related issues. (Prerequisites: INTP-335 and INTP-336 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**
- INTP-461** **Introduction to Legal Interpreting**
This course will introduce students to the field of legal interpreting. Students will learn about the legal and judicial systems while examining the role, function, ethics, safeguards and challenges of interpreting in legal and courtroom settings. Students will employ a multidisciplinary approach to learning about legal interpreting through legal research and writing, observation, guest lecturers, and interpreting practice. (ASLINT-BS YR 3 or 4) **Lec/Lab 4, Credits 3 (Spring)**
- INTP-481** **Community Interpreting**
This course will address the evolution of professionalization within the field of interpreting, as well as explore various aspects of working in the community and the dynamics surrounding community involvement. This course is highly interactive, highlighting a variety of guest presenter and panelists from the Rochester community. Topics of discussion are: working with Deaf professionals, working with Deaf interpreters, business practices, professional supervision and Video Relay Service (VRS) settings. Within these major topics, discussion will include discretionary practices, ethical decision-making, current standards and community connections and resources. The objective is to guide students in traversing the dialectic, rather than eliciting right or wrong answers that simply reflect the rhetoric of the interpreting field. (3rd or 4th year status in Program). (ASLINT-BS YR 3 or 4) **Lecture 3, Credits 3 (Fall, Spring)**
- INTP-485** **Undergraduate Research: ASL-English Interpretation**
This course is a faculty-directed student research project at the undergraduate level. The research will entail an in-depth study in the discipline that could be considered of an original nature. Enrollment in this course requires permission from the Department Chair and completion of the NTID Undergraduate Research Contract. **Research, Credits 1 - 4 (Fall, Spring)**
- INTP-489** **Special Topics: ASL-English Interpretation**
The description for the special topics course will be specified in each course proposal. **Lecture, Credits 1 - 3 (Fall, Spring)**
- INTP-491** **Introduction to Video Relay Services and Video Remote Interpreting**
This course is a knowledge/skills-based course that examines interpreting via distance technology including video relay and video remote interpreting. Lessons present both information and skill building activities to increase competence in video interpreting. The purpose of the course is to present factors that influence interpreting competence via distance technology and to increase interpreting competence as it applies to distance technology. In this course, students will learn federal regulations related to the VRS (Video Relay Service) industry, conversation management techniques in both ASL and English, and hearing phone norms versus Deaf video phone norms. In addition, other topics and activities will include interpreting for phone trees and recordings, ad hoc teaming, and how to apply the Demand Control Schema to the VRS/VRTI setting. (Prerequisites: INTP-310 or equivalent course and at least 3rd year status in ASLINT-BS program.) **Lecture 3, Credits 3 (Spring)**
- INTP-510** **Interpreting Research Setting**
This online course will prepare interpreting students for working in research settings. Students will learn about the lived experience of Deaf scientists and how to effectively work with them by utilizing a variety of tools and strategies. Students will also become familiar with procedures and protocols for interpreting in research settings including lab-based work, meeting with collaborators, and professional conferences. Additionally, students will have the opportunity to build upon their American Sign Language (ASL) and English skills, specifically working on how to translate and interpret basic research related terminology and jargon. This course involves online video lectures in both English and ASL, video observations and case studies, and online group discussions. Grading in the course will be based on students' participation online and performance on their assignments. Students can receive credit for INTP-510 or HCIA-610, not for both. (ASLINT-BS YR 3 or 4) **Lecture 3, Credits 3 (Spring)**
- American Sign Language**
NASL-180 **New Signers Program**
The New Signers Program is an intensive, fast-paced, summer pre-college experience designed for newly admitted deaf and hard-of-hearing students who have little or no prior skill in American Sign Language. Through a variety of learning experiences such as lectures, small group activities, and evening activities where students interact with other deaf and hard-of-hearing individuals, students will learn how to use ASL to communicate in real-world conversations and situations that are likely to occur on the college campus. Students will reach at a Novice-Low to Novice-Mid ASL level as recognized by American Council on the Teaching of Foreign Languages. Interactive evening activities provide opportunities for students to be immersed in deaf culture. Students will also prepare self-reflection journals in which they document their development as signers and members of the Deaf community. (NTID Supported Students.) **Lab 4, Credits 4 (Summer)**
- NASL-180** **New Signers Program**
The New Signers Program is an intensive, fast-paced, summer pre-college experience designed for newly admitted deaf and hard-of-hearing students who have little or no prior skill in American Sign Language. Through a variety of learning experiences such as lectures, small group activities, and evening activities where students interact with other deaf and hard-of-hearing individuals, students will learn how to use ASL to communicate in real-world conversations and situations that are likely to occur on the college campus. Students will reach at a Novice-Low to Novice-Mid ASL level as recognized by American Council on the Teaching of Foreign Languages. Interactive evening activities provide opportunities for students to be immersed in deaf culture. Students will also prepare self-reflection journals in which they document their development as signers and members of the Deaf community. (NTID Supported Students.) **Lecture 2, Credits 4 (Summer)**
- NASL-190** **NTID American Sign Language I**
This course is designed for deaf and hard-of-hearing students who have little or no prior skill in American Sign Language. Students will begin to develop receptive and expressive skills needed to converse about familiar topics using a variety of phrases, simple sentences, and questions. Students will learn vocabulary, grammar, and cultural protocols for communicating at a Novice-Low to Novice-Mid ASL level as defined by the American Council on the Teaching of Foreign Languages. (Prerequisites: This class is restricted to NTID supported students who have completed NASL-180 or equivalent course with a minimum grade of C- or better.) **Lecture 4, Credits 4 (Fall, Spring)**
- NASL-190** **Independent Study: American Sign Language**
(Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 3 (Fall, Spring)**
- NASL-200** **NTID American Sign Language II**
Students will develop receptive and expressive skills needed to converse about familiar topics using a series of discrete sentences. Students will learn vocabulary, grammar, and cultural protocols for communicating at a Novice-Mid to Novice-High ASL level as defined by the American Council on the Teaching of Foreign Languages. (Prerequisites: This class is restricted to NTID supported students who have completed NASL-180 or NASL-190 or equivalent course with a minimum grade of C or better.) **Lecture 4, Credits 4 (Fall, Spring)**
- NASL-210** **NTID American Sign Language III**
Students will develop ASL receptive and expressive skills needed to communicate discrete paragraphs composed of connected sentences. At the end of semester, students will achieve effective communication by using vocabulary, grammar, and cultural protocols for conveying details about familiar topics at a Novice-High to Intermediate-Low level as defined by the American Council on the Teaching of Foreign Languages. (Prerequisites: This class is restricted to NTID supported students who have completed NASL-200 or equivalent course with a minimum grade of C or better.) **Lecture 4, Credits 4 (Spring)**

NASL-230**Beginning Mexican Sign Language**

This course will offer beginning level Mexican Sign Language "Lengua de Senas Mexicana" (LSN). Students are required to have at least intermediate level of ASL skills. In this course, students will learn basic vocabulary, alphabet, numbers, and grammatical aspects of LSM, which they will compare with those of ASL. In addition, they will learn about Mexican culture, traditions, norms, and values along with Mexican deaf culture and compare those with the general U.S. culture and Deaf culture in the United States. (Prerequisites: This class is restricted to at least 3rd year standing in ASLINT-BS or NTID supported students and INTP-226 or MLAS-401 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

NASL-240**Beginning Russian Sign Language**

This course will offer a beginning level of Russian Sign Language (RSL). Students are required to have at least intermediate level of ASL skills. In this course, students will learn basic vocabulary, alphabet, numbers, and grammatical aspects of RSL, which they will compare with those of ASL. In addition, they will learn about Russian culture, traditions, norms, and values along with Russian deaf culture and compare those with the general U.S. culture and Deaf culture of the United States. Students will also learn how to write some basic words in Russian language. (Prerequisites: This class is restricted to at least 3rd year standing in ASLINT-BS or NTID supported students and INTP-226 or MLAS-301 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

NASL-275**Structure of American Sign Language**

This course provides students with basic knowledge about the linguistic structure of American Sign Language (ASL). Through an introduction to language features, students will examine the phonology, morphology, syntax, semantics and discourse of ASL. Information regarding historical and cultural aspects of ASL is also introduced and discussed. (NTID Supported Students.) **Lecture 3, Credits 3 (Fall, Spring)**

NASL-280**Strategies for Teaching Basic American Sign Language**

This course provides an overview of how second languages have traditionally been taught, what the current methods and theories are, and their applications to the teaching of American Sign Language. Students are provided opportunities to practice basic teaching techniques, selection of appropriate materials, design lesson plans, and use of evaluation techniques, current technology, including how to teach Deaf culture and ASL grammatical features in lessons. Students learn about resources to support their efforts to teach American Sign Language. (Prerequisites: This class is restricted to NTID supported students who have completed NASL-275 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

NASL-285**Undergraduate Research: American Sign Language**

This course is a faculty-directed student research project at the undergraduate level. The research will entail an in-depth study in the discipline that could be considered of an original nature. The level of study is appropriate for students in their first three years of study. Enrollment in this course requires permission from the Department Chair and completion of the NTID Undergraduate Research Contract. **Research, Credits 1 - 4 (Fall, Spring)**

NASL-289**Special Topics: American Sign Language**

(NTID Supported Students.) **Lecture, Credits 1 - 3 (Fall, Spring)**

NASL-485**Undergraduate Research: American Sign Language**

This course is a faculty-directed student research project at the undergraduate level. The research will entail an in-depth study in the discipline that could be considered of an original nature. The level of study is appropriate for students in their final two years of study. Enrollment in this course requires permission from the Department Chair and completion of the NTID Undergraduate Research Contract. **Research, Credits 1 - 4 (Fall, Spring)**

Arts and Imaging Studies

General Arts and Imaging

NAIS-120**Principles of Design and Color**

Students will be introduced to the basic elements of two-dimensional monochromatic and color design, compositional principles, and approaches to analysis of design problems. Techniques for gathering resources to work toward possible design solutions and visualization of design concepts through the use of idea sketches to final comprehensive layouts. Color theory will be introduced. Students will also utilize basic design vocabulary to participate in critiques for the purpose of analyzing their own and other students' work. This course provides students in non-creative technical majors as well as those pursuing more creative endeavors within the graphic arts field with a fundamental overview and understanding of the design process to expand critical awareness of the importance of good design. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

NAIS-130**Raster and Vector Graphics**

This course introduces students to the skills needed for the successful production and manipulation of raster and vector images using image creation and production software. Students will work in bitmap and vector applications, producing and editing with the tools and techniques offered by the software programs such as selection techniques, basic layer controls, digital masking, image correction and enhancement. Additional topics will include the relevance of image size, resolution and file format specifications when working with raster and vector images. Comprehension and correct usage of terminology and concepts are emphasized. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

NAIS-140**Graphic Design and Typography I**

Students will learn how to work through steps of the graphic design process, starting with the identification and research of design problems, and the intended message and the target audience, to development of basic graphic design solutions presented visually through clear, well-executed layouts created by both traditional and electronic means. Fundamental graphic design and typographic principles, elements, techniques and vocabulary used in design problem solving will be introduced. Students in this course will also learn about areas/categories of graphic design, creating examples such as posters, book/CD covers and logos. Topics covering selecting appropriate printing papers, professional practices, psychology of color, and critique methods will also be introduced. (Prerequisites: Prerequisites: This class is restricted to NTID supported students that have completed NGRP-120 or NAIS-120 or equivalent course and NAIS-130 or equivalent course with a minimum grade of C.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

NAIS-150**Page Layout I**

Students will use page layout (desktop publishing) applications to design and produce pages and documents to given specifications. Skill development will include importing and placing text and graphic files, the application of style sheets, templates, snippets, libraries, and color specifications. The application of design and typographic principles, industry terminology, measurement systems, font management, and file management are also covered. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

NAIS-160**Web Design I**

This course introduces students to the fundamental skills needed to create designs that work on the World Wide Web. Students are introduced to the Internet, learn basic HTML programming for graphics, and legal issues of the Internet. Text based technology is used to separate design from content using templates and cascading style sheets (CSS). Topics such as image preparation, page design, site graphic design, navigation & linking, content, usability, speed, originality and audience are discussed. Students are expected to create web pages that demonstrate their understanding and use of basic application of the above topics. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

NAIS-199**Independent Study-Visual Communications Studies**

The description for each Independent Study request will be specified in each student proposal. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 3 (Fall, Spring)**

NAIS-201**Employment Seminar**

Provides students with an opportunity to prepare for co-op and permanent employment through activities including developing and revising resumes, cover letters and portfolios, completing forms, interviewing, developing strategies for finding job opportunities, and researching targeted companies. Discussions relating to personal finance, communication strategies, adapting to the workplace, tips for job success, and workplace expectations will be included. (This course is restricted to 2nd year students in the ARTIMG-AAS or ARTIMG-AOS program.) **Lecture 3, Credits 3 (Fall, Spring)**

NAIS-289**Special Topics-Visual Communications Studies**

The description for each Special Topics request will be specified in each course proposal. (NTID Supported Students.) **Lecture, Credits 1 - 5 (Fall, Spring)**

NAIS-291**Production Workshop**

This course reinforces the students' skills learned in their Visual Communications Studies technical courses. Students are introduced to procedures that are used in an actual graphic communications production environment, including the cost of doing business, estimating procedures, and production and quality control requirements. This course enables the student to develop and apply individual and team-building problem-solving skills as they are guided through integrated activities from creation to final product in both print and non-print media production workflows. Students work in a simulated design and production environment where they can develop their technical skills, work habits, and customer relations. (This course is restricted to ARTIMG-AAS or ARTIMG-AOS students with at least 2nd year standing.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

NAIS-292

Portfolio Workshop

This course will give students from all areas of study in the Visual Communications Studies Department an opportunity to prepare and submit portfolios of their work for final review by a jury composed of department faculty members and professionals. The course will emphasize professional procedures, work habits, and demonstration of creative and technical skills, depending on the students' areas of expertise, as well as appropriate communication with clients, presentation techniques, and ability to work as a fully contributing member of a team. (This course is restricted to ARTIMG-AAS, ARTIMG-AOS or 3DGT-AAS students with at least 2nd year standing.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

NAIS-299

Co-op: Visual Communication Studies

This course provides a ten-week (350 hours) work experience in the field. (Prerequisites: Restricted to NTID supported students that have completed NAIS-201 or equivalent course.) **CO OP 350, Credits 0 (Fall, Spring, Summer)**

3D Graphics Technology

N3DG-100

Design Drawing

This course is an introduction to the fundamentals of drawing objects depicting three-dimensional space using traditional and computer-based techniques. Students will create drawings by observation of the world and use of invented or nonobjective forms, creating surface textures, and designing and laying out compositions. Color theory will be introduced and used in the course. Students will also use and understand the basics of perspective, perspective grids, and creating and using mechanical perspective and orthogonal projections of objects. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Fall)**

N3DG-110

Basic 3D Modeling

This course is an introduction to the representation of form in three-dimensional space using 3D software. The course focuses on the development of visual and verbal vocabulary as a means of exploring, developing, and understanding 3D modeling techniques. Topics include the basics of lines, planes, contour, transforming lines into forms, interaction of lights and surfaces, perspective, resolution of geometry, and rendering. Projects will include modeling organic and inorganic forms, composition and level of detail. Structured assignments develop skills in concept generation, basic form making, techniques and craftsmanship. Emphasis is placed on workflow, teamwork, and the technical and aesthetic aspects of each project. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Fall)**

N3DG-115

Intermediate 3D Modeling and Techniques

This course will provide students with an extensive range of strategies for modeling and evaluation of the appropriate methods to use in various 3D design situations. The emphasis on the course will be on researching and problem solving in the areas of environments, interiors, spaces, objects and characters. With these techniques, students will develop intermediate skills in creating complex models of organic and inorganic forms, composition, concept art layout, and level of details. Emphasis is placed on workflow, teamwork, and technical and aesthetic aspects of each project. 3D graphics scripting will be introduced. (Prerequisites: This class is restricted to NTID supported students that have completed N3DG-100 and N3DG-110 or equivalent courses.) **Lec/Lab 5, Credits 3 (Spring)**

N3DG-140

3D Lighting and Materials

This course is an introduction to the development of surface materials in 3D software, using concepts covered in N3DG-110, Basic 3D Modeling. The emphasis on the course will be on researching and understanding the interaction of light and surface, utilizing materials, shaders, textures mapping, cameras, resolution of geometry, and rendering. Techniques for UV layout are introduced. Principles of additive and subtractive color are introduced as they relate to the interpretation of physical phenomena within a virtual world. Projects focus on using color, value and texture to enhance the representation of form and space. (Prerequisites: This class is restricted to NTID supported students that have completed N3DG-100 and N3DG-110 or equivalent courses.) **Lec/Lab 5, Credits 3 (Spring)**

N3DG-120

Advanced 3D Modeling and Techniques

This course is a comprehensive review of modeling techniques that are useful in developing environments, interiors, spaces, objects, and characters to create complex models of organic and inorganic forms. The course will cover the understanding of proportions appropriate to a variety of environments, lighting for spaces, surface design to replicate real world materials, and building to an appropriate level of detail for the project. Additional techniques for 3D compositing and digital sculpting are introduced, as well as concepts for creating stereoscopic images. The course will emphasize researching and problem solving. (Prerequisites: This class is restricted to NTID supported students that have completed N3DG-115 or equivalent course.) **Lec/Lab 5, Credits 3 (Fall)**

N3DG-220

Principles of 4D Design

In this course, students will learn to develop illustrations and animated elements that use the fourth dimension, to create time-based 3D and 2D graphics. Course content includes historic fundamentals of animation, principles of modern animation, and concepts of motion using 3D and 2D software. An overview of animation and time-based design will be introduced and discussed throughout the semester. Writing and storyboarding techniques for animation will be addressed. Vector and raster animation applications will be used. (Prerequisites: This class is restricted to NTID supported students that have completed NAIS-140 or equivalent course with a minimum grade of C or N3DG-115 or equivalent course.) **Lec/Lab 5, Credits 3 (Fall)**

N3DG-225

3D Motion

This course is an introduction to motion using three-dimensional software. The course focuses on the development of visual and verbal vocabulary as a means of exploring, developing, and understanding motion with digital geometry and in virtual spaces. Subjects covered include inverse kinematics, rigging and deformers, interaction of light and surface, basic concept of compositing, and rendering. Perception and visual thinking are emphasized in the development of projects. Projects will include modeling organic and inorganic forms, composition, level of detail, creation of space and motion. Structured assignments develop skills in concept generation, basic form making, techniques for creating motion, and craftsmanship. Emphasis is placed on workflow, teamwork, and the technical and aesthetic aspects of each project. (Prerequisites: This class is restricted to NTID supported students that have completed N3DG-220 or equivalent course.) **Lec/Lab 5, Credits 3 (Spring)**

N3DG-230

3D Printing

This course introduces students to the skills needed for the production and creation of three-dimensional printed objects using 3D modeling and production software. Students will work in 3D applications, producing and editing with the tools and techniques offered by the software programs. Structural modeling techniques and modeling approaches to creating physical 3D objects with 3D printers will be taught. The use of materials in 3D printing will be discussed and demonstrated, and students will gain an understanding of the use of specific materials to satisfy printing requirements. Additional topics will include the relevance of file format specifications in modeling, comparing differences in design approaches between 3D modeling and 3D printing, and operating 3D printers under different conditions. Capabilities of different 3D printer models will be discussed. Comprehension and correct usage of terminology and concepts are emphasized. (Prerequisites: This class is restricted to NTID supported students that have completed N3DG-210 or equivalent course.) **Lec/Lab 5, Credits 3 (Spring)**

N3DG-260

Professional Practices

The course focuses on preparing students to be ready to seek employment in the 3D graphics industry. Subjects covered include professional ethics, workplace expectations, production pipeline and an overview of copyright issues. Strategies for developing leadership, teamwork, and collaboration will be discussed. Successful self-promotion and marketing, including the development of demo reels will be introduced, along with emphasizing the importance of joining professional organizations and submission of work to competitions for the purpose of professional networking. (Prerequisites: Restricted to NTID supported students that have completed NAIS-201 or equivalent course.) **Lec/Lab 5, Credits 3 (Spring)**

N3DG-270

Capstone

For this final course in 3D Graphics Technology, students will identify an area of exploration, where they have the opportunity to work on a semester-long project. Collaborative or individual projects will be supported, and students will work closely with their instructor to develop and implement a final project that will incorporate their skills, starting from the planning stage, through completion and project presentation. Collaborative projects require the clear definition of the responsibilities of each student involved and project management responsibilities. Faculty will support and provide guidance for student work exploring an industry and skill-related topic for their capstone project. (Prerequisites: Restricted to NTID supported students that have completed NAIS-299 or equivalent course.) **Lec/Lab 5, Credits 3 (Fall)**

Graphic Design Concentration

NGRD-111

Drawing I

This course is an introduction to freehand drawing of basic forms, with an emphasis on perspective, including one-point and two-point techniques, still life studies and figure drawing. Drawing principles, materials, and techniques will be introduced. Still life study will be applied using perspective concepts, and composition, including tonal values and textures. Figure drawing will be focused on the study of line, gesture, contour, construction, proportion and tonal values. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

NGRD-115**Visual Idea Development**

This course gives students the opportunity to see themselves, their experiences and their environment as sources of creativity, through a variety of activities which will include classroom discussions; videos of artists; visiting a gallery; keeping documented written and illustrated journals, sketchbooks; and working with a team to do a project. Students learn strategies for developing concepts and organization of thought processes as well as systems to formulate solutions to design problems. The library is used for development of research skills for written and visual content. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Fall)**

NGRD-211**Drawing II**

This course continues the principles and skills developed in Drawing I, with special emphasis on the human form, including proportion, shading, light and dark, head/facial features, sustained study, and the use of figure within a composition. This course extends the various applications learned in the previous drawing and applies them to still life, drapery studies, and the human form within various environments. The use of the sketchbook will be emphasized for development of composition skills; students will use the library and other resources and will further explore various kinds of drawing materials. (Prerequisites: This class is restricted to NTID supported students that have completed NGRD-111 or equivalent course.) **Lec/Lab 5, Credits 3 (Spring)**

NGRD-221**History of Graphic Design**

This course includes the study of a survey of art and design movements, designers, and typographers who have made significant contributions to the field of Graphic Design. (NTID Supported Students.) **Lecture 3, Credits 3 (Fall)**

NGRD-230**Digital Illustration**

This course will provide students with skills and techniques used in areas of digital illustration, including comparison of techniques and functions of vector and bitmap software programs to create professional-quality renderings. Various kinds of illustration will be introduced, including editorial, book, and information illustration (illustrated charts and graphs). Students will have the opportunity to create professional quality illustrations for various audiences and media. (Prerequisites: This class is restricted to NTID supported students that have completed NAIS-140 or equivalent course with a minimum grade of C.) **Lec/Lab 5, Credits 3 (Fall)**

NGRD-240**Graphic Design and Typography II**

Students will develop advanced design solutions presented visually through clear, well executed layouts created by both traditional and electronic means. More advanced design and typography principles will be discussed. Students in this course will learn about and will create examples of various areas/categories of graphic design, including corporate graphic design, information design, advertising design, editorial design and packaging design. Topics such as using creative briefs, folding/finishing/binding methods, professional graphic design business practices and self-promotion will also be covered. (Prerequisites: This class is restricted to NTID supported students that have completed NAIS-140 and NAIS-150 or equivalent courses with a minimum grade of C.) **Lec/Lab 5, Credits 3 (Fall)**

NGRD-255**Publication Design**

In this course, focus will be placed on design of multi-paged printed graphics including brochures, booklets, catalogs, menus and editorial designs using grids to organize information. Issues such as page sequencing and pagination, readability, design flow, consistency and preparing documents to meet industry standards will be addressed. Assignments will be completed using page layout software consistent with industry standards. (Prerequisites: This class is restricted to NTID supported students that have completed NGRD-240 or equivalent course.) **Lec/Lab 5, Credits 3 (Spring)**

NGRD-266**Identity Design**

In this course, students will learn about various classifications and areas of identity design and will develop identity symbols and systems of identification and branding for businesses and organizations as well as individuals, including components such as business cards, letterheads, envelopes and invoices. Focus will be on identifying client need, budget and target audience in order to develop appropriate identity design solutions with components that are compatible, consistent, and practical to use. In addition, students will be familiarized with current brand identification system designers and current design trends in identity design. Students are expected to find a real client for at least one of the assignments for this course. (Prerequisites: This class is restricted to NTID supported students that have completed NGRD-240 or equivalent course.) **Lec/Lab 5, Credits 3 (Spring)**

NGRD-257**Animation**

In this course, students will learn how to create illustrations, create animation, and develop animated elements for web-based and stand-alone interactive media. Course content includes concepts of staging, timelines, frame rates, keyframes, transitions, and object attributes. Writing and storyboarding for animation will be addressed. Both vector and raster animation applications will be used. (Prerequisites: This class is restricted to NTID supported students that have completed N3DG-220 or equivalent course.) **Lec/Lab 5, Credits 3 (Spring)**

NGRD-258**Cartooning**

In this course, students will learn how to create cartoons, apply storytelling techniques to develop sequential graphic narratives, and develop multi page, multi-strip, or single-panel cartoons. Course content includes understanding the history of cartooning, drawing techniques (both traditional and digital methods), character creation and development, story writing, plot breakdowns, panel to panel sequencing, cartooning, and creating final output in the form of a printed comic book or an online web comic. Writing and breakdowns for cartooning will also be taught. Drawing techniques and software applications are taught and used in the course. (NTID Supported Students.) **Lab, Credits 3**

NGRD-258**Cartooning**

In this course, students will learn how to create cartoons, apply storytelling techniques to develop sequential graphic narratives, and develop multi page, multi-strip, or single-panel cartoons. Course content includes understanding the history of cartooning, drawing techniques (both traditional and digital methods), character creation and development, story writing, plot breakdowns, panel to panel sequencing, cartooning, and creating final output in the form of a printed comic book or an online web comic. Writing and breakdowns for cartooning will also be taught. Drawing techniques and software applications are taught and used in the course. (NTID Supported Students.) **Lecture 5, Credits 3**

Graphic Production Concentration**NGRP-110****Digital Photography I**

This course gives students an introduction to the tools, techniques and terminology of digital photographic imaging through a series of hands-on activities that will permit each student to investigate the applications of digital photography. Students will be expected to capture images using digital cameras, process digital images using the appropriate software, create quality picture files and prints, and participate in project-related critiques. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

NGRP-120**Principles of Graphic Production**

This course provides students with a general understanding of the graphic production industries, its techniques, tools, and standards. A range of production technologies and deliverables will be examined and experienced first-hand. Exemplar workflows will be analyzed based on reverse engineering from the desired product. Students will gain a basic understanding of the design process, develop a critical awareness of good design and its value in the workflow, and explore the variables impacting the quality and cost of the production process. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Fall)**

NGRP-210**Digital Photography II**

Aesthetic/composition considerations will be emphasized. Various genres and markets will be discussed such as photo journalism, portraiture, fine art, advertising and marketing, sports, and still life. This course will also address various technologies for the capturing and converting of multiple static images into more dynamic presentations of environments, and objects. Topics will include panoramic stitching, creating virtual tours, creating 360 degree views of 3D objects, and creating dynamic slide shows. Students will be taught basic techniques for studio lighting and will be asked to produce photographs to match an art director sketch or layout. (Prerequisites: This class is restricted to NTID supported students that have completed NGRP-110 or equivalent courses.) **Lec/Lab 5, Credits 3 (Spring)**

NGRP-220**Videography**

This course provides an overview of videography for the web. This is a basic digital video course that introduces the process and procedures involved in digital video production from start to finish. Students will be introduced to videography production techniques, camera operation and formats, digital non-linear editing, titling and lighting for video. Emphasis is on development of ideas, proper operation of video and computer equipment for productions and post-production of digital non-linear edited sequences and their adaptation to different presentation formats for online delivery. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Fall)**

NGRP-231**Image Preparation**

Students will build on the skills previously learned in Raster and Vector Graphics. This course includes specialized image preparation techniques used to acquire, optimize, correct, reconstruct, restore, and enhance images for placement in print and digital media layouts. Topics include: determining and applying resolution and magnification settings appropriate to the characteristics of the specified purpose of an image, setting highlight and shadow points, removing color cast, sharpening, and tone-adjustment of acquired images; the use of desk-top scanners hardware/software; the use of appropriate color settings/modes and file formats. (Prerequisites: This class is restricted to NTID supported students that have completed NAIS-130 and NAIS-150 or equivalent courses with a minimum grade of C and NAIS-160 or equivalent course.) **Lec/Lab 5, Credits 3 (Fall)**

NGRP-232

Image Manipulation

This course emphasizes the procedures and skill development required for the efficient and effective manipulation and compositing of digital images in a production environment building on the skills previously learned in Raster and Vector Graphics. This is a production-oriented course with a focus on the non-destructive editing of (primarily raster) digital images. This course includes specialized image manipulation methods such as advanced selection and masking techniques for producing images that blend together into a single composite image. Additional topics include applying production planning techniques to image manipulation, production quality standards, advanced methods and quality criteria for image manipulation, and legal and ethical issues. (Prerequisites: This class is restricted to NTID supported students that have completed NAIS-130 equivalent course with a minimum grade of C.) **Lec/Lab 5, Credits 3 (Spring)**

NGRP-245

Color Theory and Management

This course includes the study and management of color for design, printing, web, and photographic imaging systems and procedures. Students will use and apply correct technical vocabulary, and various concepts and procedures related to the perception, specification, evaluation, correction, and management of color in various graphic arts. (Prerequisites: Prerequisites: This class is restricted to NTID supported students that have completed NGRP-120 or NAIS-120 or equivalent course and NAIS-130 or equivalent course with a minimum grade of C.) **Lec/Lab 5, Credits 3 (Fall)**

NGRP-250

Page Layout II

This course builds on topics presented in Page Layout I. Students will define and apply techniques and procedures for optimizing document design and production efficiency. Topics include defining paragraph, character, and object styles; making and using templates; saving and accessing object snippets and libraries; accessing and using database information to create documents, recognizing and applying proofreaders marks and notations; defining and applying advanced typographic techniques, advanced page layout procedures, object transparency and other image effects; building and editing tables; and, defining and applying color specifications and effects; and using document output procedures. Students will continue to develop knowledge and skills in the industry leading page layout software applications. (Prerequisites: This class is restricted to NTID supported students that have completed NAIS-150 or equivalent course with a minimum grade of C.) **Lec/Lab 5, Credits 3 (Spring)**

NGRP-251

Publication Production

The students will study the use of page layout applications to produce book, magazine, and long format publications. Topics include techniques for specifying and applying publication templates; font management and selection; page formats; page and section numbering; headers and footers; text editing; graphics creation, preparation, and placement; color specification and usage; automating a table of contents; using a colophon and other features typical for book and long document publishing formats. Students are introduced to the repurposing of documents for interactive digital media and XML-based document production. (Prerequisites: This class is restricted to NTID supported students that have completed NGRP-250 or equivalent course.) **Lec/Lab 5, Credits 3 (Fall)**

NGRP-252

PDF Production and Workflow

The students will study the Portable Document Format (PDF) file format including defining and applying specifications for color management, file optimization and file security; recognizing and editing PDF documents; and using PDF files in a variety of print and non-print media production workflows. Topics include procedures for making PDF files, and adding interactive features including bookmarks, action button, hyperlinks to internal anchors, and hyperlinks to other documents and Web content. Emphasis is given to file optimization for interactive display size formats, color, and resolution. (Prerequisites: This class is restricted to NTID supported students that have completed NAIS-130 and NAIS-150 or equivalent courses with a minimum grade of C.) **Lec/Lab 5, Credits 3 (Spring)**

NGRP-260

Web Design II

This course provides an overview of designing multi-page web sites and being sure they are accessible to audiences with special needs. Students will continue to learn how to use website concepts and design elements learned in Web Design I to successfully to create a multi-page web site. Effective use of color, typography, and design will be applied to website design. Students will continue the study and application of Web design concepts, site navigation, interactivity, and the management of a multi-page web site. Students will develop a web site that combines the advantages of text-based production techniques and graphics-based design with content management systems, with a focus on usability and accessibility. (Prerequisites: This class is restricted to NTID supported students that have completed NAIS-160 or equivalent course.) **Lec/Lab 5, Credits 3 (Spring)**

NGRP-270

Specialty Graphics Imaging

This course provides students with a unique set of knowledge and skills required for the preparation, production, finishing, material handling, mounting and displaying of wide format products. Students will study procedures used to create products that include large display signage and decals, vehicle wraps, packaging mock-ups, point-of-purchase display elements, vinyl appliqué, magnetic and tieback signage, and large-scale presentation displays, and other large-scale signage. (Prerequisites: This class is restricted to NTID supported students that have completed NAIS-130 and NAIS-140 or equivalent courses with a minimum grade of C and NGRP-110 and NGRP-231 or equivalent courses.) **Lec/Lab 5, Credits 3 (Fall)**

NGRP-275

Digital Printing Systems

This course will focus on the operating features of the black & white and color digital production printing systems. Students will learn the job and market capability of the various systems, xerography concepts in monochrome printing, image and paper quality considerations, creation of electronic files and file transfer, and operating procedures. Additional topics include the digital workflow for on-demand book printing and small-format binding. (Prerequisites: This class is restricted to NTID supported students that have completed NAIS-130 and NAIS-150 or equivalent courses with a minimum grade of C.) **Lec/Lab 5, Credits 3 (Fall)**

Business Studies

Accounting Technology

NACC-130

Personal Finance

This course provides students with information and resources needed to understand the creation and implementation of a budget, use of credit and borrowing money responsibly, financial rights and ways to safeguard their money, and factors used to determine their readiness to buy a home or make other major purchases. Information on financial institutions such as banks, credit unions, and savings and loan organizations will also be covered. This course will provide students with basic financial literacy so they can develop sound financial management of their personal income as well as an understanding of the economic events that can influence their financial well being and society as a whole. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

NACC-199

Independent Study: Accounting Technology/Business Technology

The description for each Independent Study request will be specified in each student's proposal. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 3 (Fall, Spring, Summer)**

NACC-201

Accounting 1

Introduction to accounting principles for both accounting and nonaccounting students. Both service and merchandising (retail/wholesale) businesses are introduced. Areas covered include: analyzing and recording of business transactions using the double-entry accounting system; end-of-period adjustments; worksheet; financial statements; closing entries; and post-closing trial balance. Students complete a comprehensive "accounting cycle" project. Computerized spreadsheet applications are required. (Prerequisites: This class is restricted to NTID supported students who have completed NAST-160 or equivalent course.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

NACC-202

Accounting 2

This course is a continuation from Accounting 1. Topics covered include: accounting principles and procedures related to notes payable and receivable, the valuation of receivables, inventories, fixed assets, partnerships, capital stock, retained earnings, taxes, dividends, bonds, the statement of cash flow, and the analysis of financial statements. A comprehensive capstone project is completed. Computerized spreadsheet applications are required. (Prerequisites: This class is restricted to NTID supported students who have completed NACC-201 or equivalent course.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

NACC-203

Accounting 3

Cost accounting is the focus of this course. Coverage includes manufacturing statements, cost theory, integration of materials, labor and overhead, average and FIFO process costing methods, equivalent units, multiple products, changes in units, budgeting, cost classification and computerized applications. Students complete a comprehensive project. Computerized spreadsheet applications are required. (Prerequisites: This class is restricted to NTID supported students who have completed NACC-202 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NACC-204

This capstone experience gives students an opportunity to reinforce and apply accounting skills previously studied. Students will apply skills using a variety of approaches including case studies, simulations, projects, teamwork, and presentations. Students will research, review and interpret financial data and its impact on managerial decisions. The course will also discuss the workplace as it relates to communication, interpersonal skills, decision-making, ethics and lifelong learning skills in a professional accounting environment. (Prerequisites: This class is restricted to NTID supported students who have completed NACC-203 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NACC-205

Introduction to accounting principles for both accounting and non-accounting students. Both service and merchandising (retail/wholesale) businesses are introduced. Areas covered include: analyzing and recording of business transactions using the double-entry accounting system; adjusting and closing entries and financial statement preparation. Generally accepted accounting principles, accounting ethics and analytical tools help students become informed users of financial statements. (NTID Supported Students.) **Lecture 3, Credits 3 (Fall, Spring)**

NACC-206

Introduction to the use of cost accounting information by managers within a business. This course includes development of manufacturing statements, cost theory, integration of materials, labor and overhead, job order and process costing, flexible budgeting and evaluating the performance of managers and divisions through variance analysis. (Prerequisites: This class is restricted to NTID supported students who have completed NACC-205 or equivalent.) **Lecture 3, Credits 3 (Fall, Spring)**

NACC-289**Special Topics: Accounting Technology/Business Technology**

The description for each Special Topics request will be specified in each course proposal. (NTID Supported Students.) **Lecture, Credits 1 - 3 (Fall, Spring, Summer)**

NACC-299**Co-op: Accounting Technology/Business Technology**

Designed to give the student an opportunity to gain work experience, to apply what has been learned and to self-evaluate personal and communication skills. Placement assistance is provided to help the student find a job related to his/her field of study. One co-op experience is required for graduation. **CO OP, Credits 0 (Fall, Spring, Summer)**

Administrative Support Technology**NAST-140****Essential Document Production**

This course is for students with little or no knowledge of word processing software, limited keyboarding experience, and those that have a minimum of 20 net words per minute. Emphasis is on keyboarding skill development as well as an introduction to basic word processing skills. Students key and format business correspondence, reports, and tables. The expectation is to exit this course with a 30 net words per minute typing proficiency for five minutes. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

NAST-150**Advanced Document Production**

This course focuses on effective management of document production activities by selecting an appropriate format or template, applying graphic enhancements as needed, and saving the document in an appropriate business format. Business correspondence, newsletters, tables, forms and reports will be produced using word processing software. Emphasis is on the mastery of basic skills and their application to a variety of realistic office document production projects. Typing skill development continues with an expected exit speed to 40+ net words per minute for five minutes. (Prerequisite: This class is restricted to NTID supported students who have completed NAST-140 or equivalent course.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

NAST-160**Fundamentals of Spreadsheet Applications**

Emphasis will be on creating, formatting, and enhancing worksheets; creating and applying formulas and functions; building and formatting charts; using What-If analysis and creating templates. Upon completion, students will be able to design and enhance basic spreadsheets. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

NAST-199 Independent Study: Administrative Support Technology/Business Technology

The description for each Independent Study request will be specified in each student's proposal. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 3 (Fall, Spring, Summer)**

NAST-210**Essentials of Business Communication**

This is a course in the essentials of business communication for today's fast-paced global environment. Emphasis will be on the message and the modes of communication used in the business environment. Participants will engage in effective communication skills through writings (traditional and electronic), face-to-face interactions, and team presentations. Course content will also include emphasis on non-grammar language applications in business communication. (NTID Supported Students.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NAST-215**Integrated Document Production**

The course further develops student skills in integrated document formatting and applications using various types of word processing, spreadsheets, databases, slide presentations, and electronic office procedures. Through business simulations, students will have an opportunity to incorporate their speed/accuracy and production skills with communication, information, and file management skills. The expectation is to exit this course with a 50 net words per minute proficiency for a five-minute timing. (Prerequisite: This class is restricted to NTID supported students who have completed NAST-150 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NAST-220**Fundamentals of Database Applications**

This course introduces the fundamental concepts of a database management system for creating, maintaining, manipulating, retrieving, and printing business data. Students will learn to create various forms and design reports for storing and displaying data. In addition, the student will create switchboard systems and allow users to view data in multiple dimensions. Students will also learn to save database objects in HTML format so they can be viewed by a browser and imported or exported in XML format. (NTID Supported Students.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NAST-225**Fundamentals of Graphic Applications**

This course provides students with a basic knowledge of graphics on a windows platform. Students will be introduced to basic design principles and develop the ability to choose, modify and effectively use appropriate graphics for a variety of communication formats. Students will be required to produce an e-portfolio to document the skills learned in the AST program. (Prerequisites: This class is restricted to NTID supported students who have completed NAST-215 or (0804-291 and 0804-302) or equivalent course.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NAST-230**Fundamentals of Desktop Publishing**

This course focuses on conceptual and technical approaches to desktop publishing and graphic design as applied to office communications. Emphasis is on the use of design principles related to color, space, text, and images in preparation of digital design layouts. Students will be required to enhance their AST e-portfolio using desktop publishing and web design skills acquired in this course. (Prerequisites: This class is restricted to NTID supported students who have completed NAST-225 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NAST-240**Administrative Support Technology Seminar**

This course provides students with an opportunity to prepare for employment through a formal mentoring experience, team presentation, and guest presentations. Topics for discussion are project management, assertiveness training, leadership styles, effective one-on-one interpersonal and electronic communication, protocol for working with an interpreter, and lifelong learning as necessary for job success. Through weekly meetings with their mentors, students will share responsibility for interactions, establish a learning relationship, increase self-direction, and gain a greater understanding of the workplace. (Prerequisites: This class is restricted to NTID supported students who have completed NAST-210 or (0806-101 and 0804-110) or equivalent course.) **Lec/Lab 4, Credits 3 (Spring)**

NAST-241**Preparation for Microsoft Word Certification**

This course is intended to prepare students to take a certification exam for Microsoft Word. The exam tests proficiency through hands-on assessment in simulated Microsoft Office Word applications. Skill sets include creating and customizing documents, formatting content, working with visual content, organizing content, reviewing documents, and sharing and securing content. (Prerequisite: This class is restricted to NTID supported students who have completed NAST-150 or equivalent course.) **Lab 2, Credits 1 (Fall, Spring)**

NAST-242**Preparation for Microsoft PowerPoint Certification**

This course is intended to prepare students to take a certification exam for Microsoft PowerPoint. The exam tests proficiency through hands-on assessment in simulated Microsoft Office PowerPoint applications. Skill sets include: Creating and formatting presentations, creating and formatting slide content, working with visual content, and collaborating on and delivering presentations. (Prerequisites: This class is restricted to NTID supported students who have completed NAST-225 or equivalent course.) **Lab 2, Credits 1 (Fall, Spring)**

NAST-243**Preparation for Microsoft Excel Certification**

This course is intended to prepare students for Microsoft Excel certification. The exam tests proficiency through hands-on assessment in simulated Microsoft Office Excel applications. Skill sets include: creating and manipulating data, formatting data and content, creating and modifying formulas, presenting data visually, and collaborating and securing data. (Prerequisites: This class is restricted to NTID supported students who have completed NAST-215 or (0804-291 and 0804-302) or equivalent course.) **Lab 2, Credits 1 (Fall, Spring)**

National Technical Institute for the Deaf

NAST-244 **Preparation for Microsoft Access Certification**
This course is intended to prepare students to take a certification exam for Microsoft Access. The exam tests proficiency through hands-on assessment in simulated Microsoft Office Access applications. Skill sets include: structuring a database, creating and formatting database elements, entering and modifying data, creating and modifying queries, presenting and sharing data, and managing and maintaining databases. (Prerequisites: This class is restricted to NTID supported students who have completed NAST-220 or equivalent course.) **Lab 2, Credits 1 (Fall, Spring)**

NAST-289 **Special Topics: Administrative Support Technology/Business Technology**
The description for each Special Topics request will be specified in each course proposal. (NTID Supported Students.) **Lecture, Credits 1 - 3 (Fall, Spring, Summer)**

NAST-299 **Co-op: Administrative Support Technology/Business Technology**
Designed to give the student an opportunity to gain work experience, to apply what has been learned and to self-evaluate personal and communication skills. Placement assistance is provided to help the student find a job related to his/her field of study. One co-op experience is required for graduation. **CO OP, Credits 0 (Fall, Spring, Summer)**

General Business

NBUS-199 **Independent Study: Business Administration**
The description will be specified on each Independent Study Contract. (NTID Supported Students.) **Ind Study, Credits 1 - 3 (Fall, Spring, Summer)**

NBUS-200 **Orientation to Business**
This course introduces students to a broad overview of the form and structure of multinational organizations. It provides students with a basic knowledge of the history, organization and operation of business and its particular vocabulary. (NTID Supported Students.) **Lecture 4, Credits 3 (Fall, Spring)**

NBUS-211 **World of Business and Innovation**
This course is an overview of the functions and processes of business organizations. Topics include the roles and responsibilities of the manager, managing business ethics and social responsibility, competing in a global environment, organizational structure and authority, and managing diversity, change, communication and innovation. (NTID Supported Students.) **Lecture 3, Credits 3 (Fall, Spring)**

NBUS-213 **Applied Ethics**
This course introduces ethical issues facing the workplace. Students will learn about common work-related ethical issues, and evaluate problems concerning professional conduct and moral conflict. Students will also learn what ethical behavior is, how to recognize ethical behavior, and how to model ethical behavior in the workplace. Individual, organizational and societal needs will be taken into consideration during the students' decision-making process (NTID Supported Students.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NBUS-217 **Fundamentals of Management**
This course focuses on the management aspect of organizations. Students will learn a variety of methods management uses to stay organized, lead and motivate employees as well as how controls are established to ensure company goals are met. Emphasis will be placed on understanding the multi-faceted roles of leaders and managers in the workplace. (Prerequisites: This class is restricted to NTID supported students who have completed NBUS-200 or equivalent course.) **Lecture 4, Credits 3 (Fall, Spring)**

NBUS-220 **Introduction to Economics**
This course gives an overview of economic concepts. Students examine economic problems in a rational manner by learning the fundamental processes of economic analysis and the skills of economic reasoning. This course includes selected knowledge and skills from the economic discipline presented in the form of concepts and applications that are most important to economic literacy for students. **Lec/Lab 4, Credits 3 (Fall)**

NBUS-221 **Essentials of Human Resource Management**
This course acquaints students with the basic concepts of Human Resource Management. Exposure to the changing nature of Human Resources relates to employee retention, legality, EEO/Diversity, job analysis, recruitment, selection, training and development as well as performance management, compensation, benefits, employee relations and labor relations. An overview of the range of duties and levels of responsibilities found in this sector of the business environment will allow students to identify similarities between job function required of an administrative assistant and of a human resources assistant. (Prerequisites: This class is restricted to NTID supported students who have completed NBUS-217 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NBUS-223 **Fundamentals of Marketing**
This course introduces the field of marketing and its focus on how consumer behavior effects in the marketplace (domestically and internationally). Emphasis will be placed on understanding the marketing mix and its impact on the external market environment. (Prerequisites: This class is restricted to NTID supported students who have completed NBUS-200 or equivalent course.) **Lecture 4, Credits 3 (Fall, Spring)**

NBUS-224 **Business Law**
This course will provide students with a comprehensive view of the American legal system. It will begin with an introduction to the fundamentals of business law and traverse into actual case studies for the purpose of observing the development and applications of legal principles in a business activity. Topics covered include the foundations of law, courts and court procedures, crimes and torts, employment and agency relationships, contracts, sales, and negotiable instruments. Students will exit the class with a working knowledge of the legal framework within which formal business organizations must operate. (Prerequisite: NBUS-213 or equivalent course.) **Lec/Lab 4, Credits 3 (Spring)**

NBUS-225 **Introduction to Entrepreneurship**
This course introduces the role of the entrepreneur in identifying opportunities, seeking funding and other resources, and managing the formation and sustainability of the new venture. Emphasis will be placed on understanding the development process from idea generation to realization of a product or service by creating a business plan. (NTID Supported Students.) **Lecture 3, Credits 3 (Fall, Spring)**

NBUS-226 **Introduction to Organizational Behavior**
The purpose of this course is to provide students with the tools to understand and analyze behaviors of individuals, groups and the organization itself. Through class discussions, assignments and case analysis, students will determine the impact of the behaviors on the organization. Students will then determine how the organization can be managed more effectively to enhance employees work experiences while maintaining organizational success. Students will exit the course with a clearer understanding of how to create and maintain a productive work environment that will help organizations perform more effectively. (Prerequisites: NBUS-217 and NBUS-221 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

NBUS-227 **Principles of Marketing**
This course introduces the field of marketing and its focus on how consumer purchasing behavior impacts the marketplace (domestically and internationally). Emphasis will be placed on understanding the customers' needs and wants, marketing mix and its impact on the external market environment. Students will demonstrate the marketing concepts, principles and strategies through the development of a marketing plan. (NTID Supported Students.) **Lecture 3, Credits 3 (Fall, Spring)**

NBUS-228 **Leadership Essentials**
The purpose of this course is to develop personal leadership skills that can be applied in the business world. The course will focus on concepts of leadership, followership and motivation, and the impact on organizations. Self-examination of leadership skills will result in a personal profile of strengths and weaknesses that students will be able to analyze and use to create an action plan. Leadership elements such as developing personal goals and objectives, decision-making, time management, team building, conflict resolution, dealing with change, ethics, and diversity issues will be explored. By the end of the course, students will have increased their personal and interpersonal awareness and gained a greater understanding of the complex issues facing today's leaders. (Prerequisites: NBUS-217 and NBUS-221 or equivalent courses.) **Lec/Lab 4, Credits 3 (Fall)**

NBUS-285 **Undergraduate Research: Business Studies**
This course is a faculty-directed student research project at the undergraduate level. The research will entail an in-depth study in the discipline that could be considered of an original nature. Enrollment in this course requires permission from the Department Chair and completion of the NTID Undergraduate Research Contract. **Research, Credits 1 - 4 (Fall, Spring)**

NBUS-289 **Special Topics: Business Administration**
The description will be specified in each Special Topic Documentation Form. (NTID Supported Students.) **Lecture, Credits 1 - 3 (Fall, Spring, Summer)**

NBUS-299 **Co-op: Business Administration**
Designed to give the student an opportunity to gain work experience, to apply what has been learned and to self-evaluate personal and communication skills. Placement assistance is provided to help the student find a job related to their field of study. One co-op experience is required for graduation. (NTID Supported Students.) **CO OP, Credits 0 (Fall, Spring, Summer)**

Career Development

NCAR-010

Freshman Seminar

The course provides incoming deaf and hard-of-hearing students admitted to NTID undergraduate programs with opportunities to develop/enhance academic skills, personal awareness, and community involvement in order to maximize their college experience. Students will have opportunities to explore and navigate the college environment, develop/reinforce academic skills, and participate in experiential learning opportunities while establishing meaningful connections with faculty, staff and peers. The course promotes the development of plans for ongoing growth and involvement in class and in the RIT/NTID and/or broader community. (NTID Supported Students.) **Lec/Lab 2, Credits 0 (Fall, Spring)**

NCAR-015

Strategies for Successful Online Learners

This seven-week course is designed to prepare deaf and hard-of-hearing students enrolled in a fully online degree program at RIT/NTID to be successful in their courses. In this course, students will navigate the university's online environment; practice effective strategies for successful online learning; establish meaningful connections with faculty, staff, and student peers; and learn about the university's services and resources. Successful students can earn up to 7 badges that reflect competency in areas associated with successful online learning: using RIT's course management system (myCourses); leveraging RIT's academic and technical resources; participating in an online learning community; exploring RIT Student Services; and developing effective time management, study, and test-taking strategies. Completing this course will help students to establish effective online learning habits and will provide them with a solid foundation for ongoing success as an online learner at RIT. (This course is restricted to BUSADN-AAS Major students.) **Lecture 1, Credits 0 (Fall, Spring, Summer)**

NCAR-101

Academic Success and College Readiness

This course is designed to assist academically suspended students in the development of their academic and personal skills in order to be successful in college. Students will undertake small group and individualized learning paths to practice academic and college readiness skills, including improving motivation, managing time, setting goals, and caring for oneself. We will address continued development of reading comprehension and written communication skills will also be addressed. Successful application of study and test-taking techniques, understanding how to set priorities, coping with college stress and anxiety, and developing a mindset for academic success constitute overarching themes of this course. **Lec/Lab 3, Credits 3**

NCAR-115

Career Decision Making

This course provides information and experiences regarding career exploration, career options, workforce trends, and educational requirements. Students acquire career information from relevant resources and select an appropriate career using a decision-making model. Students develop a career plan after completing a self-assessment, gathering information on his/her specific career option, and participating in a program sampling experience of NTID/RIT academic disciplines. (NTID Supported Students.) **Lec/Lab 3, Credits 2 (Fall, Spring)**

NCAR-289

Special Topics: Career Exploration Studies

The description for each Special Topic course will be specified in each course proposal. **Lec/Lab, Credits 1 - 4 (Fall, Spring)**

Communication Studies

NCOM-120

Problem Solving

This course sharpens students' ability to think clearly, logically and creatively and to communicate knowledge effectively in an academic setting. Students will learn critical thinking strategies for examining issues and solving problems. Course topics include solving problems using a six-step model; exploring problem solving tools and strategies using campus resources, professional and proactive communication behaviors, and personal attributes for success, and applying knowledge of students' rights and responsibilities to facilitate effective problem solving for academic and personal/social problems. The importance of thinking critically across various communication contexts (i.e., face-to-face interactions, written correspondence, group discussions, and presentations) will be stressed. (Prerequisites: NTID supported student.Co-requisites: NENG-102 or NENG-103 or NENG-112 or equivalent course.) **Lab 2, Credits 3 (Fall)**

NCOM-120

Problem Solving

This course sharpens students' ability to think clearly, logically and creatively and to communicate knowledge effectively in an academic setting. Students will learn critical thinking strategies for examining issues and solving problems. Course topics include solving problems using a six-step model; exploring problem solving tools and strategies using campus resources, professional and proactive communication behaviors, and personal attributes for success, and applying knowledge of students' rights and responsibilities to facilitate effective problem solving for academic and personal/social problems. The importance of thinking critically across various communication contexts (i.e., face-to-face interactions, written correspondence, group discussions, and presentations) will be stressed. (Prerequisites: NTID supported student.Co-requisites: NENG-102 or NENG-103 or NENG-112 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

NCOM-199

Independent Study: Communication Studies and Services

The description for each Independent Study request will be specified in each course proposal. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 4 (Fall, Spring)**

NCOM-201

Interpersonal Relationships

This course examines the role of communication as it relates to establishing, maintaining, and ending relationships. Topics include: relationship development; self-concept; perceptions and first impressions; stereotyping, prejudice and discrimination; conflict resolution; active and passive listening; personal and social values; self-disclosure; gender-related communication; intercultural competence; and social networking. (NTID Supported Students.) **Lecture 3, Credits 3 (Fall, Spring)**

NCOM-202

Communication Across Cultures

This course is intended to provide students with an introduction to the concepts of culture, communication, and communication across cultures by incorporating social, economic and political contexts and examining the differences among the world's population. The students will learn about the relationship between culture and communication, increase their understanding of the communication relationship created by language, understand how that relationship differs when communicating across cultures, and examine how to reduce potential conflicts. Students will study a variety of cultures from around the globe including, but not limited to, African-American, Middle Eastern, Caribbean, Hispanic/Latino, and Asian Cultures, along with cultural differences related to religion, gender, the military, and Deaf culture. Communication within and across the cultures will be examined, along with differences between the deaf and hearing co-cultures. (Prerequisites: ISTE-110 or ENGL-150 or ENGL-150H or UWRT-100 or UWRT-150 or NENG-213 or NENG-221 or any other higher level NENG or equivalent courses or (scores of 50-59 on NTID Writing Test and 98-124 on NTID Reading Test).) **Lecture 3, Credits 3 (Fall, Spring)**

NCOM-204

Dialogue on Black Perspectives

This course will challenge students to analyze and compare various perceptions about Black American life in the 21st century. This course includes but is not limited to racial, economic, and ideological shifts and their impact on past and current events. Cultural influences will be traced from early Western Africa to the United States. Viewpoints on identity, language, relationships, and generational differences will be explored through assigned readings and interviews. Students will lead the class in open dialogues associated with their researched topics. In addition, varying perspectives will be presented through lectures, guest speakers and personal experiences from individuals with diverse cultural backgrounds. Upon completion of this course, it is anticipated that students will have broader knowledge of the multidimensional aspects of the Black experience. (NTID Supported Students.) **Lecture 3, Credits 3 (Fall, Spring)**

NCOM-206

Effective Teams

This course focuses on the information and skills needed to be a knowledgeable, effective participant in small groups and teams. Topics related to group dynamics and team building are addressed at the practical and theoretical levels. These topics include characteristics of effective teams, stages of group development, how groups operate for different outcomes, group versus personal goals, the role of diversity, and group decision-making and conflict management strategies. (NTID Supported Students.) **Lecture 3, Credits 3 (Fall, Spring)**

National Technical Institute for the Deaf

NCOM-207

Organizational Communication and the Deaf Employee

This course examines interpersonal and small group communications in organizational settings in today's global, corporate climate, with emphasis on important aspects of communication for deaf individuals entering a professional career. Students become familiar with the business environments of large and small companies and the implication of company size regarding personnel decisions. Case studies from selected corporations provide insights into elements of communication processes such as networks (electronic and non-electronic), organizational structures, managerial decision-making, interviewing, organizational development, and conflict resolution. Companies' perspectives on hiring culturally and ethnically diverse individuals and Deaf individuals are discussed. Laws, such as Americans with Disabilities Act (ADA), related to the hiring and support of disabled workers are addressed. Additionally, processes to effectively communicate and market entrepreneurial business plans as a strategy for employment in an evolving world economy will be reviewed. (NTID Supported Students.) **Lecture 3, Credits 3 (Fall, Spring)**

NCOM-208

Critical Thinking

This course sharpens students' ability to think clearly, logically and creatively in order to establish well-supported solutions and conclusions in a variety of situations. Critical thinking and reasoning strategies are learned and applied. Course topics include problem solving, the types and general rules of arguments, the analysis of arguments and rhetoric found in contemporary life, and argumentative writing and presentation. The importance of thinking critically and effectively during communication regardless of modality (writing, reading, signing, speaking, listening) is stressed. (NTID Supported Students.) **Lecture 3, Credits 3 (Fall, Spring)**

NCOM-285

Undergraduate Research: Communication Studies

This course is a faculty-directed student research project at the undergraduate level. The research will entail an in-depth study in the discipline that could be considered of an original nature. Enrollment in this course requires permission from the Department Chair and completion of the NTID Undergraduate Research Contract. **Research, Credits 1 - 4 (Fall, Spring)**

NCOM-289

Special Topics: Communication Studies and Services

The description for each Special Topics request will be specified in each course proposal. (NTID Supported Students.) **Lecture 3, Credits 1 - 4 (Fall, Spring)**

NCOM-371

Introduction to Cued American English

This course is an introduction to the Cued Speech system of representing spoken American English, its history, and application. Students will increase their awareness of spoken English and the pronunciation of words in conversation. They will also understand and describe the purpose of Cued Speech, as well as identify other populations and uses for Cued Speech. Students will understand the language learning benefits of Cued Speech. Upon completion of the course students will be able to accurately use Cued Speech to convey spoken American English. Students will receive credit for INTP-371 or NCOM-371, not both. **Lecture 3, Credits 3 (Fall)**

NCOM-475

Advanced Cued American English

This course is a blended course (classroom/online) that builds upon the foundations of the Cued Speech System. Cued Speech is a phonemically based system that uses hand shapes and mouth movements to represent spoken language, in this case spoken American English. In this course, students will practice transliterating from spoken American English to cued spoken American English in order to increase speed and fluency while maintaining accuracy of the Cued Speech system. Students will also boost receptive abilities by watching online videos of deaf native users of Cued American English. This class will prepare the students for transliterating in the classroom. They will also deepen their understanding of the research and methodology behind the applications of Cued Speech via reading research articles and presenting their findings to the class. Various transliterators will visit the class to discuss their experiences with Cued Speech while explaining the process of achieving certification at the national level. (Prerequisites: INTP-371 or NCOM-371 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

NCOM-489

Special Topics: Communication Studies

The description for the special topics course will be specified in each course proposal. **Lecture, Credits 1 - 3 (Fall, Spring)**

Engineering Studies

Applied Mechanical Technology

NETS-101

Fundamentals of Engineering

This course will introduce students to the field of mechanical engineering technology through an exposition of its disciplines, including basic mechanics, fluid power, and energy. Students will be introduced to design and engineering problem solving methods that will be applied to problems in the aforementioned topic areas. Students will analyze data, perform design calculations, solve equations, and program devices. Project reports are generated through the integration of these tools with word processing and presentation software. The application of software tools to the engineering design process will be emphasized throughout. (NTID Supported Students.) **Lab 4, Credits 3 (Fall, Spring)**

NETS-110

Fundamentals of Engineering

This course will introduce students to the field of mechanical engineering technology through an exposition of its disciplines, including basic mechanics, fluid power, and energy. Students will be introduced to design and engineering problem solving methods that will be applied to problems in the aforementioned topic areas. Students will analyze data, perform design calculations, solve equations, and program devices. Project reports are generated through the integration of these tools with word processing and presentation software. The application of software tools to the engineering design process will be emphasized throughout. (NTID Supported Students.) **Lecture 1, Credits 3 (Fall, Spring)**

NETS-110

Foundations of Materials

This course introduces students to the commonly used families of materials. It focuses on the fundamental principles of properties of materials utilized in the practice of engineering. Metals, ceramics, polymeric materials and composites are studied, with a particular emphasis in steels and non-ferrous metals. Material selection is also discussed. (Prerequisites: NTID supported student.Co-requisites: NETS-111 or equivalent course.) **Lecture 2, Credits 2 (Fall)**

NETS-111

Foundations of Materials Lab

Properties of materials will be determined through experimentation and use of reference sources. (Prerequisites: NTID supported student.Co-requisites: NETS-110 or equivalent course.) **Lab 2, Credits 1 (Fall)**

NETS-120

Manufacturing Processes

This introductory course investigates the four major categories of traditional manufacturing processes as well as newly developed non-traditional techniques. This course focuses on understanding the concepts of past and current manufacturing processes. Students will learn how typical industrial piece parts and assemblies are manufactured. Topics focus on processes and related theory for the traditional manufacturing processes of material removal, metal forming, joining, casting and molding, as well as more recently developed processes such as powder metallurgy, rapid prototyping, EDM, chemical machining, water jet, LASER and plasma cutting. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Spring)**

NETS-150

Mechanical Design and Fabrication

This introductory course investigates basic engineering concepts and how they relate to traditional manufacturing processes and techniques. Topics will emphasize the design of components through the use of solid modeling, dimensioning, tolerancing, geometric dimensioning and tolerancing, and statistics. In a related laboratory course, students will be expected to build, inspect, and integrate their designs. (Prerequisites: NTID supported student.Co-requisites: NETS-151 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

NETS-151

Mechanical Design and Fabrication Lab

This lab course integrates basic manufacturing techniques with engineering design concepts. Traditional machine shop tools and precision measuring instruments will be used by the students as they create the objects that they designed in the related classroom course. (Prerequisites:NTID supported student.Co-requisites: NETS-150 or equivalent course.) **Lab 2, Credits 1 (Spring)**

NETS-285

Undergraduate Research: Engineering Studies

This course is a faculty-directed student research project at the undergraduate level. The research will entail an in-depth study in the discipline that could be considered of an original nature. Enrollment in this course requires permission from the Department Chair and completion of the NTID Undergraduate Research Contract. **Research, Credits 1 - 4 (Fall, Spring)**

Computer-Aided Drafting Technology

NCAD-108

Data Collection and Analysis

Students develop hands-on experience with basic measuring instruments used by the A/E/C industry through lab and field activities. Students develop a methodology for recording field measurements that can be accurately converted into digital documentation. Students also develop the ability to interpret industry standard construction documentation produced by others. (Prerequisites: This class is restricted to NTID supported students who have completed NCAD-150 or equivalent course.) **Lec/Lab 5, Credits 3 (Spring)**

NCAD-112

Computing Tools for Engineering Technology

This course provides a foundation of computer skills common to classroom and work environments in engineering related fields. These include skills with using operating systems, networks, the internet, common office productivity tools, and graphics tools. Assignments will include engineering communication and problem solving components. Effective communication strategies will be explored in giving a presentation. Students will also develop a basic website which will be used as a basis for the student's electronic portfolio. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Fall)**

NCAD-150**Engineering Graphics in AEC**

The objective of this course is to introduce students to engineering graphics as a means of communication in the technical fields of architecture, engineering and construction (A/E/C). The course is laboratory oriented and provides the student with basic skills to create professional 2D drawings with this comprehensive first course in the use of AutoCAD software for mechanical, architectural and civil drawings. The course assumes no prior knowledge of engineering drawing or CAD. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Fall)**

NCAD-170**Construction CAD I**

The objective of this course is to learn the fundamental concepts of building information modeling (BIM) and how computer aided drafting (CAD) is used to produce basic construction documents. Students will learn to create a basic BIM project as well as learn basic AEC concepts and terms. Students will also develop effective time management skills and file management strategies. (NTID Supported Students.) **Lab 9, Credits 3 (Spring)**

NCAD-180**Civil Technology Graphics**

The objective of this course is to develop an understanding of drawings and practices used in the civil drafting field. Students engage in sketching exercises as well as use computer aided drafting tools to create plans and drawings for civil engineering projects. Students are introduced to mapping, surveying, GIS, plot plans, contour lines, highway layout, profiles and earthwork drawings. Students develop an understanding of the technical and legal purpose of these drawings and how to assemble them. No official prerequisites are required, but students should have basic computer literacy skills. (Prerequisites: This class is restricted to NTID supported students who have completed NCAD-150 or equivalent course.) **Lec/Lab 5, Credits 3 (Spring)**

NCAD-199**Independent Study CADT**

The description for each Independent Study request will be specified in each student proposal. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 5 (Fall, Spring)**

NCAD-201**Job Search Process for CADT**

Course goals are to prepare students to secure a cooperative or professional work experience in the student's major and to assist the student in acquiring the skills for accessing information, networking, developing resumes and letters, completing various employment-related forms, interviewing, and using various communication techniques in preparing students for the job search process. This course also includes a lab where students will design and create a hard-copy and a web-based electronic portfolio, and students will engage in practice interviews to effectively communicate the contents of their portfolio. (NTID Supported Students.) **Lec/Lab 4, Credits 3 (Fall)**

NCAD-220**Construction CAD II**

The objective of this course is to learn how Building Information Modeling (BIM) can bring different disciplines together in a coordinated way to facilitate the design of a building. The course will build on the CAD skills learned in Construction CAD I to develop a more complex commercial BIM project that includes Architecture, MEP services and structural systems. Students will learn various AEC concepts and terms as well as how to organize a set of construction documents. (Prerequisites: This class is restricted to NTID supported students who have completed NCAD-108 and NCAD-170 or equivalent courses.) **Lab 9, Credits 3 (Fall)**

NCAD-230**Construction CAD III**

Students learn to apply 3-D CAD techniques to a multi-level construction project situated on a site with significant topographic features. Students will function as a team to create a total project model. Structural systems will be integrated into the construction of the building model. Students will extract and refine a series of orthographic views of the site and building models such that a comprehensive set of working drawings is produced. (Prerequisites: This class is restricted to NTID supported students who have completed NCAD-220 and NCAD-255 or equivalent courses.) **Lab 9, Credits 3 (Spring)**

NCAD-240**Advanced Construction CAD**

Students develop CAD and BIM skills gained in previous courses by adding skills in design development. The project, a building of two or more stories, requires the synthesis of information and principles both from previous courses and from reference sources. Students will create a BIM project from preliminary drawings. Some design work will be required as students will incorporate information from building codes, specifications and data for mechanical, electrical and plumbing (MEP) services and structural systems. (Prerequisites: This class is restricted to NTID supported students who have completed NCAD-230, NCAD-265, NCAD-275 and NCAD-285 or equivalent courses. Co-requisites: NCAD-250 or equivalent course.) **Lab 9, Credits 3 (Fall)**

NCAD-245**Energy Modeling for Sustainable Construction**

This course explores the fundamental relationship between building systems and energy. It also, addresses the building envelope (outside walls, roofing) and how location, siting, landscaping, and material selections affect the energy consumption of a project. Students will be introduced to energy analysis software available through the United States Department of Energy. Students will also learn to apply BIM software to analyze the energy efficiency of building design iterations. (Prerequisites: This class is restricted to NTID supported students who have completed NCAD-220 or equivalent course.) **Lec/Lab 5, Credits 3 (Spring)**

NCAD-250**Presentation Graphics**

Students gain specialized skills and knowledge in production of presentation graphics using CAD and visualization software. Using general CAD skills as a starting point, students learn to setup and render various types of images and animations for presentation of construction projects to clients, agencies, boards, and the public. Students will engage in a team design project which will culminate with a final presentation. (Co-requisites: NCAD-240 or equivalent course and NTID supported student.) **Lab 5, Credits 3 (Fall)**

NCAD-255**Construction Materials and Methods I**

Students study soil, aggregate, Portland cement concrete, asphalt cement concrete and wood products used for construction. Laboratory work focuses on testing soil, aggregates and Portland cement concrete. ASTM standards are used in all testing. Students also test mortar using ASTM standards and follow building codes for framing construction. Students will engage in hands-on lab activities. (Prerequisites: This class is restricted to NTID supported students who have completed NCAD-108 and NCAD-170 or equivalent courses.) **Lec/Lab 5, Credits 3 (Fall)**

NCAD-265**Construction Materials and Methods II**

This course is a continuation of the Construction Materials and Methods I course. Students learn standard technical vocabulary related to common construction materials, basic building science concepts related to thermal insulation and moisture protection, and various construction framing methods. Students will also learn the aesthetic, economic and performance characteristics of a wide variety of non-structural materials and finish products associated with the construction industry. Hands-on lab activities are used to learn how many common products are installed. (Prerequisites: This class is restricted to NTID supported students who have completed NCAD-255 or equivalent course.) **Lab 3, Credits 3 (Spring)**

NCAD-265**Construction Materials and Methods II**

This course is a continuation of the Construction Materials and Methods I course. Students learn standard technical vocabulary related to common construction materials, basic building science concepts related to thermal insulation and moisture protection, and various construction framing methods. Students will also learn the aesthetic, economic and performance characteristics of a wide variety of non-structural materials and finish products associated with the construction industry. Hands-on lab activities are used to learn how many common products are installed. (Prerequisites: This class is restricted to NTID supported students who have completed NCAD-255 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

NCAD-275**Principles of Structural Systems**

In this course, students learn the basic concepts of loads and stresses and how the structural members of a construction project support and distribute loads. The overview includes the practical aspects of how structural elements as assembled and incorporated into construction projects and the influence of building codes on the selection of structural systems. (Prerequisites: This class is restricted to NTID supported students who have completed NCAD-108 and NCAD-170 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

NCAD-280**GIS Fundamentals**

Students develop basic skills in applications of geographic information systems (GIS). Through hands-on projects, students will learn how to use GIS software, plan a project, create a database, conduct spatial analysis, and create presentation graphics. No official prerequisites are required, but students should have basic computer literacy skills. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Spring)**

NCAD-285**MEP Systems**

Students learn to identify the basic components and operation of the mechanical, electrical and plumbing (MEP) systems for a construction project. These systems include water supply, sanitary sewer and waste water treatment, storm drainage, solid waste handling, power supply generation, indoor climate control, lighting and communication systems. Students will learn the advantages of specifying sustainable solutions for these systems. Students will become acquainted with the graphic representation of these systems on construction documentation. (Prerequisites: This class is restricted to NTID supported students who have completed NCAD-220 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

NCAD-289**Special Topics: CADT**

The description for each Special Topics request will be specified in each course proposal. (NTID Supported Students.) **Lecture, Credits 1 - 5 (Fall, Spring)**

National Technical Institute for the Deaf

NCAD-299

Designed to give the student an opportunity to gain experience on the job, to apply what they have learned and to self-evaluate personal and communication skills. Placement assistance is provided to help the student find a relevant work experience. (Prerequisites: This class is restricted to NTID supported students who have completed NCAD-201 or equivalent course.) **CO OP, Credits 0 (Fall, Spring, Summer)**

Computer Integrated Machining Technology

NCIM-243

In this course students learn techniques used for testing spherical surfaces, flats, and prisms. Topics include measurement of surface quality, focal length, power, irregularity, angle of deviation, basic interferometry, fringe analysis and lens aberrations. Specific measuring techniques and instruments include auto collimation, distance object method, laser two-beam method, spherometers, micrometers, Ronchi testers and test plating. (Prerequisites: This class is restricted to NTID supported students that have completed NPMT-121 or equivalent courses.) **Lec/ Lab 4, Credits 3 (Fall, Spring)**

Co-op: CADT

Optical Testing

English (NTID)

NENG-102

Introductory Reading and Writing I

This is a developmental English language course at the first level offered at NTID in which students begin developing the skills necessary for understanding and using written English in AOS degree programs at NTID. World knowledge topics are presented in various media and provide the context in which students learn to: comprehend and use the basic constituents of English sentence; develop a content word vocabulary of about 4000 words; and practice strategies for improving reading comprehension and written expression. In order to continue their reading and writing skill development in Intermediate Reading & Writing I (NENG-112) students must complete this course with a C or better. (NTID Reading Test score below 50 and NTID Writing Test score below 80). (This class is restricted to NTID supported students that have an NTID Reading Test score below 80 and an NTID Writing Test score below 50.) **Lecture 6, Credits 6 (Fall)**

NENG-103

Introductory Reading and Writing II

This is a developmental English language course at the first level offered at NTID for students who begin with reading skills higher than those in NENG-102 or have received an E grade in NENG-102. Students continue developing the skills necessary for understanding and using written English in AOS degree programs at NTID. World knowledge topics are presented in various media and provide the context in which students learn to: comprehend and use more of the basic constituents of English sentences; develop a content word vocabulary of about 4000 words; and practice strategies for improving reading comprehension and written expression. In order to continue their reading and writing skill development in Intermediate Reading & Writing I (NENG-112) students must pass this course. (NTID Writing Test score below 40 and NTID Reading Test score 80 to 97 or grade of "D" in NENG-102). (Prerequisites: This class is restricted to NTID supported students that have completed NENG-102 or equivalent course.) **Lecture 4, Credits 3 (Fall, Spring)**

NENG-112

Intermediate Reading and Writing I

This is the first course in a two-course developmental English language sequence at the second level offered at NTID in which students work on reading and writing skills necessary for AOS programs at NTID. General topics in science and humanities provide the context in which students review the basic constituents of English sentences, begin to develop skills for comprehending and using complex sentence elements, increase their English content word vocabulary to about 5000 words, learn to use independent reading strategies, and develop skills for writing paragraphs and longer compositions. Upon successful completion of this course, students will continue their reading and writing skill development in Intermediate Reading & Writing II (NENG-113). (Prerequisites: Restricted to NTID supported students with NENG-102 (grade of C or better) or NENG-103 or equivalent course or students with an NTID Reading test score of 80-97 and an NTID Writing test score of 40-59.) **Lecture 3, Credits 3 (Fall, Spring)**

NENG-113

Intermediate Reading and Writing II

This is the second course in a two-course developmental English language sequence at the second level offered at NTID for students who have completed Intermediate Reading & Writing I. Students continue to work on reading and writing skills necessary for AOS programs at NTID. General topics in science and humanities provide the context in which students use the skills included in Intermediate Reading & Writing I, develop skills for comprehending and using additional complex English sentence elements, increase their content word vocabulary to about 6000 words, begin to evaluate reading tasks to select appropriate reading strategies, and expand their skills for writing paragraphs and longer compositions. Upon successful completion of this course, AOS students will continue their reading and writing skill development in Career English courses. (Prerequisites: This class is restricted to NTID supported students that have completed NENG-112. Students with at least 98 on NTID Reading test and at least 40 on NTID Writing test are also permitted to enroll in this course.) **Lecture 3, Credits 3 (Fall, Spring)**

NENG-199

The description for each Independent Study request will be specified in each course proposal. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 6 (Fall, Spring)**

Independent Study: English

NENG-212

This is the first course in a two-course sequence. It is designed to develop reading, writing, grammar, and vocabulary skills that students need for AOS course work and for the work environment. The reading and writing components are thoroughly integrated with approximately equal time being devoted to each. Grammar and vocabulary are thoroughly integrated into the reading and writing components. Course content includes general and technical articles, memorandums, letters, electronic communication, directions, work-related forms, and short report. (Prerequisites: This class is restricted to NTID supported students that have completed NENG-113 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

Career English I

NENG-213

This is the second course in a two-course sequence. It is designed to advance and refine reading, writing, grammar, and vocabulary skills that students need for AOS course work and for the work environment. The reading and writing components are thoroughly integrated with approximately equal time being devoted to each. Grammar and vocabulary are thoroughly integrated into the reading and writing components. Course content includes general and technical articles, memorandums, letters, electronic communication, directions, work-related forms, and short reports. (Prerequisites: This class is restricted to NTID supported students that have completed NENG-212 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

Career English II

NENG-221

This is the first course in a four-course intensive English sequence. In this course, selected shorter readings give students the opportunity to strengthen their reading comprehension skills and world knowledge. Readings will include nonfiction, fiction, and theme-based articles from library databases. The readings also serve as prompts for writing at both the paragraph and essay levels. While developing their expository writing skills, students learn to recognize and apply the traditional rhetorical modes used in writing. Students also will develop skills in summary writing. Other components of the course include grammar and vocabulary instruction, along with editing and proofreading strategies. Vocabulary is taught both incidentally as it appears in readings and formally using a vocabulary text. The readings follow a specific theme and also will serve as models for examining style, organization and grammar. In order to continue their reading and writing skill development in Bridge to College English I (NENG-231) and Bridge to College English II (NENG-232), students must complete this course and co-requisite Analytical Reading and Writing II (NENG-222) with grades of "C-" or better. (NTID Reading Test score 98-124 and NTID Writing Test score 50-59, or by department permission. (Prerequisites: This class is restricted to NTID supported students who have an NTID Reading Test of 98-124 and an NTID Writing Test score of 50-59. Co-requisites: NENG-222 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

Analytical Reading and Writing I

NENG-222

This second course in the four-course intensive English sequence continues to strengthen students' reading comprehension skills and world knowledge, with an added emphasis on critical reading, thinking, and writing. Readings will include nonfiction, fiction, and theme-based articles from library databases. Students identify and examine an author's purpose and tone, bias, assumptions, opinions, facts, examples, evidence, patterns of organization, and audience. Students also develop inference and deduction skills while learning to recognize and avoid overgeneralization and oversimplification in their writing. This course, which follows a specific theme, includes a short novel or novelette—fiction or non-fiction—as part of the required reading. In order to continue their reading and writing skill development in Bridge to College English (NENG-231) and Bridge to College English (NENG-232) students must complete this course and co-requisite Analytical Reading and Writing I (NENG-221) with grades of "C-" or better. (NTID Reading Test score 98-124 and NTID Writing Test score 50-59; or by department permission. (Prerequisites: This class is restricted to NTID supported students who have an NTID Reading Test score of 98-124 and an NTID Writing Test score of 50-59. Co-requisites: NENG-221 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

Analytical Reading and Writing II

NENG-231**Bridge to College English I**

This is the first of two Bridge to College courses that also serve as the final two courses in the four-course intensive English sequence. This course exposes students to a variety of reading material, including nonfiction, fiction, and theme-based articles from library databases. It includes a reading of a full-length novel, either fiction or non-fiction, and it offers strategies for reading comprehension and interpretation beyond prior courses where applicable. Students will engage in a variety of writing activities related to the readings. Vocabulary is taught both incidentally as it appears in readings and formally using a vocabulary text. In order to qualify for testing and placement in Written Communication (NENG-241), Critical Reading and Writing (UWRT-100) or First Year Writing: Writing Seminar (UWRT-150) students must complete this course and co-requisite Bridge to College English II (NENG-232) with grades of "C-" or better. (NENG-221 and NENG-222 with grades of C- or better, or NTID Reading Test score 125-144 and NTID Writing Test score 60 or greater. (Prerequisite: Restricted to NTID supported students and taken NENG-221 and NENG-222 or equivalent courses with C- or better or with NTID Reading test score of 125-144 and NTID Writing test score of 60 or greater) Corequisite: NENG-232 or equivalent course) **Lecture 3, Credits 3 (Fall, Spring)**

NENG-232**Bridge to College English II**

This is the second of two designated Bridge to College English courses that also serve as the final two courses in the four-course intensive English sequence: This course provides advanced instruction on expository writing with a focus on refining writing skills introduced in earlier courses where applicable. This course also provides instruction on responding to multiple-part writing prompts. Students taking this as a stand-alone course will use readings from textbooks and online and database sources as the basis for their writing. The course provides further instruction in integrating sources into writing. Some writing assignments may be managed through journal entries. In order to qualify for testing and placement in Written Communication (NENG-241), Critical Reading and Writing (UWRT-100) or First Year Writing: Writing Seminar (UWRT-150) students must complete this course and co-requisite Bridge to College English I (NENG-231) with grades of "C-" or better. (NENG-221 and NENG-222 with grades of C- or better or NTID Reading Test score 136-144 and NTID Writing Test score 60 or greater) . (Prerequisite: Restricted to NTID supported students and taken NENG-221 and NENG-222 or equivalent courses with C- or better or with NTID Reading test score of 136-144 and NTID Writing test score of 60 or greater) Corequisite: NENG-231 or equivalent course) **Lecture 3, Credits 3 (Fall, Spring)**

NENG-289**Special Topics: English**

The description for each Special Topics request will be specified in each course proposal. (NTID Supported Students.) **Lecture, Credits 1 - 6 (Fall, Spring)**

Humanities and Social Sciences

NHSS-110**Perspectives on Literature and the Arts**

Students are introduced to basic concepts and terminology in the study of the humanities (visual and performing arts, history, and philosophy) through a variety of literary works presented in English and/or American Sign Language (short story, storytelling, novel excerpts, drama, film, poetry, and ASL literature). Students will learn about intellectual/academic inquiry and issues studied within these disciplines. (NTID Supported Students.) **Lecture 3, Credits 3 (Spring)**

NHSS-111**The Changing American Family**

Students are introduced to basic concepts and terminology in the study of the evolving American family from its Judeo-Christian roots to its multi-cultural reality in the 21st century. Students will learn about the nature of the family unit, the contributions of its members to the family organization, the family's contribution to society, and the current trends in the American family. (NTID Supported Students.) **Lecture 3, Credits 3 (Fall)**

NHSS-159**Deaf Community in the Modern World**

Introduces students to American and international aspects of Deaf culture and community. Students learn about the language, norms of behavior, values and traditions of Deaf people. Historical and sociological perspectives and cross-cultural issues related to the hearing and Deaf communities are analyzed. The formation of the Deaf community and Deaf culture is studied to illustrate the meaning of Deaf Heritage and how art, sports, organizations, and technology have combined to impact the lives of Deaf people. The achievements of many Deaf people in a variety of fields are reviewed to underscore self-identity and self-advocacy issues. The study of cultural, economic and political history is used to broaden understanding of current events. (NTID Supported Students.) **Lecture 3, Credits 3 (Fall, Spring)**

NHSS-180**Introduction to Social Sciences**

This course is intended to explore the understanding of human behavior and everyday life using important concepts from social sciences. The course covers the fields of psychology, sociology, and political science. Materials from anthropology and economics may be used as well. The course focuses on the application of the social sciences to the study of business, art, education, government, and other areas of interest. (NTID Supported Students.) **Lecture 3, Credits 3 (Fall, Spring)**

NHSS-199**Independent Study: Humanities and Social Sciences**

The description for each Independent Study course will be specified in each course proposal. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 4 (Fall, Spring)**

NHSS-219**Understanding Human Interaction Through Dramatic Literature**

Students will study dramatic literature with a special emphasis on analyzing the interpersonal communication among characters in written texts and engaging in presentations, performances, and role playing. Students will apply their insights to real life situations. They will also present their analyses to an audience and/or perform scenes from plays. The course will enable students to gain important insights into their own patterns of communication and develop effective strategies for presenting information to audiences and engaging in interpersonal communication. Each student is responsible for their own communication in the classroom. This course is open to all RIT students; an interpreter will not be provided. **Lecture 3, Credits 3 (Spring)**

NHSS-251**Deaf Culture and Contemporary Civilization**

This course is intended to provide students with an understanding of contemporary civilization and how it affects Deaf people's lives. Students will learn key influences and develop an understanding of their impact on Deaf people via the topics of language, psychology, history, bioethics and human rights. Students will study a variety of social and cultural groups in order to understand the value of Deaf people in contemporary civilization. (Students in AOS or CARPRP-UND are not eligible to take this course.) **Lecture 3, Credits 3 (Fall)**

NHSS-260**Deaf People and Civil Rights**

Students will learn the history and achievements of Deaf civil rights, as well as current challenges and future directions of Deaf culture and civil rights. Students will learn the basic history of disenfranchised groups in the United States, how the civil rights process is begun and its ultimate impact on the mainstream society. The course places special emphasis on research and analysis of the Americans with Disabilities Act and involvement in a civil rights project. (NTID Supported Students.) **Lecture 3, Credits 3 (Fall, Spring)**

NHSS-270**Multiculturalism in the Deaf Community**

Introduces students to multiculturalism in the Deaf community. Students learn about facts and stereotypes related to race, ethnicity, gender, sexuality and physical challenges. The cycle and internalization of biases (attitudes) and discrimination (action) will be studied. Recognition of similarities and differences related to disability, medical, racial, ethnic, social-minority, and cultural models will be explored to understand perceptions of disabled vs. able bodied individuals. (NTID Supported Students.) **Lecture 3, Credits 3 (Fall, Spring)**

NHSS-275**Visual Expression of Deaf Culture**

This course introduces students to Deaf Cultural Studies using stories about the Deaf experience. Students will interpret works in visual art, film, performing arts, and literature (ASL and English). Students will learn how historical/social/political and intersectional context, Deaf cultural values, and themes and symbols influence our interpretation of these creative works. Finally, the importance of collective memories for preserving Deaf cultural norms/values and promoting social justice will be addressed. **Lecture 3, Credits 3 (Fall, Spring)**

NHSS-279**Seminar in Deaf Cultural Studies**

Using a seminar approach, this course gives students the opportunity for focused, in-depth study of a specialized topic in the field of Deaf Cultural Studies. Specific topics vary from semester to semester, and address such areas as language and communication, the arts in Deaf culture, identity and diversity in the Deaf community, and political, social and legal issues. This course is repeatable for credit. (NTID Supported Students.) **Lecture 3, Credits 3 (Fall, Spring)**

NHSS-281**Civic Engagement**

This course provides students with opportunities to engage in community service with Deaf and hearing socially responsible and sustainability focused organizations. Some examples of service learning opportunities might include working with Rochester School for the Deaf to establish an edible schoolyard, Habitat for Humanity to help build low cost, energy efficient, sustainable homes or working with organizations such as Foodlink and Rochester Roots which partner with local farmers to provide people in need with healthy food and provide sustainably produced local food. Students will undertake a civic engagement project where their individual contributions will be amplified through purposeful involvement with local and global organizations. Students will research social, political, economic and environmental issues that affect individuals, local and global communities, and become actively involved in seeking, proposing, and acting on solutions to selected problems. Students will explore ways in which change is an individual and collective responsibility, driven by the interconnectivity of self, local community, and global society. (NTID Supported Students.) **Lecture 3, Credits 3 (Fall, Spring)**

NHSS-285**Undergraduate Research: Humanities and Social Science**

This course is a faculty-directed student research project at the undergraduate level. The research will entail an in-depth study in the discipline that could be considered of an original nature. Enrollment in this course requires permission from the Department Chair and completion of the NTID Undergraduate Research Contract. **Research, Credits 1 - 4 (Fall, Spring)**

National Technical Institute for the Deaf

NHSS-289

Special Topics: Humanities and Social Sciences

The description for each Special Topics request will be specified in each course proposal. (NTID Supported Students.) **Lecture, Credits 1 - 4 (Fall, Spring)**

Information and Computing

Applied Computer Technology-AS degree

NACA-150

Network and Security Fundamentals

This course introduces students to fundamental concepts and concerns in the networking and security fields. Issues of privacy, vulnerability, and tools for intrusion prevention will be key topics addressed as they relate to personal computer, network and data security. Concepts and terminology of wired and wireless networks, including networking hardware, media, communication technologies, protocols and basic network administration will be covered. Lab activities will develop skills in installing, configuring, securing, managing, and troubleshooting a basic LAN network. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

NACA-160

Programming Fundamentals I

This course will provide students with a study of the fundamental concepts, logical structures, and algorithms inherent to computer programming. Students will learn how to write basic object-oriented programs in a contemporary programming language. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

NACA-161

Programming Fundamentals II

This course builds upon the programming skills developed in Programming Fundamentals I and will cover more advanced object-oriented programming concepts, logical structures, and algorithms. Visual information system modeling, graphical user interfaces and software testing topics will be covered. (Prerequisites: This class is restricted to NTID supported students who have completed NACA-160 or equivalent course.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

NACA-172

Website Development

This course introduces students to web page and small-scale website development. Through hands-on laboratory experiences, students will learn the fundamental concepts needed to construct web pages that follow appropriate coding standards as well as basic design principles to present content in an attractive and organized manner. Topics include HTML, CSS, graphical elements, website publishing, and transfer protocols. (NTID Supported Students.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NACA-174

Website Implementation

This course builds upon the concepts of Website Development to provide students with a strong foundation in designing and implementing complex websites. Topics covered include usability, multimedia, design principles, client-side scripting, SSI, access control, and interactive pages using forms and validation. (Prerequisites: This class is restricted to NTID supported students who have completed NACA-172 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NACA-199

Independent Study: ACT AS

The description for each Independent Study will be specified in each course proposal. (NTID Supported Students.) **Ind Study, Credits 1 - 4 (Fall, Spring)**

NACA-285

Undergraduate Research: Applied Computer Programming

This course is a faculty-directed student research project at the undergraduate level. The research will entail an in-depth study in the discipline that could be considered of an original nature. Enrollment in this course requires permission from the Department Chair and completion of the NTID Undergraduate Research Contract. **Research, Credits 1 - 4 (Fall, Spring, Summer)**

NACA-289

Special Topics: ACT

The description for each Special Topics course will be specified in each course proposal. **Lecture, Credits 1 - 4 (Fall, Spring)**

Applied Computer Technology-Technical Computing

NACT-120

Intro to Computer Applications

This course is an introduction to using general-purpose software tools. The tools to be covered include word processing, spreadsheet, database, and presentation software as well as an email client. Students will do hands-on work in each application. (NTID Supported Students.) **Lec/Lab 3, Credits 3 (Fall, Spring)**

NACT-150

Intro to PC Hardware

This course introduces the fundamental hardware concepts of Windows-based computers. The skills required to install, upgrade and maintain computers are presented. The course provides students with methodologies and hands-on activities related to the configuration, diagnosis, repair, upgrade, and preventive maintenance of computer hardware, input/output devices and data communications. Topics include the basic functions and use of test equipment, logical troubleshooting of internal system conflicts and faulty peripherals, and electrical safety. (NTID Supported Students.) **Lec/Lab 4, Credits 3 (Fall)**

NACT-151

Windows Operating Systems

This course is designed to acquaint students with the structure and function of windows-based operating systems and to provide the skills required to install, configure and maintain them. Topics include system concepts, system level commands, and commands relating to program, file and applications management. Students perform a variety of functions, including OS installation and configuration, application program installation and management, creation and management of directories and file structures, and partitioning and preparation of storage media. (Prerequisites: This class is restricted to NTID supported students who have completed NACT-150 or equivalent course.) **Lec/Lab 4, Credits 3 (Spring)**

NACT-155

Non-Windows Operating Systems

This course exposes students to Unix and other Unix-based operating systems such as Linux and Macintosh systems. It acquaints them with system services that are of interest to normal users, power users, and administrators. Students learn basic commands, scripting, and navigation from a terminal window and experience management of their user environment, files, and directories. Students are also exposed to administering some common aspects of the operating environments such as groups, users, privileges, and process management. There is also some exposure to the operating system's GUI interface. (Prerequisites: This class is restricted to NTID supported students who have completed NACT-150 or equivalent course.) **Lec/Lab 4, Credits 3 (Spring)**

NACT-160

Networking Essentials

This course introduces students to the basics of user security on their computers as well as the basics of computer networking. Students will learn the importance of user security and some of the tools and procedures needed to protect and secure their information, computers and networks against attack. Basic concepts and terminology of wired and wireless networking including networking hardware, media, communication technologies and protocols, and network management will be covered. Lab activities will develop skills in installing, configuring, managing, and troubleshooting a basic network. (NTID Supported Students.) **Lec/Lab 4, Credits 3 (Fall)**

NACT-161

Client/Server Networks

This course continues the concepts of computer networking with an emphasis on the networking client/server model. Various networking operating systems (NOS) will be examined as well as both peer-to-peer and client/server network applications. NOS hardware and software security tools are investigated and students learn how to install, configure, update/maintain and troubleshoot both the client/server hardware devices as well as the appropriate security tools. (Prerequisites: This class is restricted to NTID supported students who have completed NACT-160 or equivalent course.) **Lec/Lab 4, Credits 3 (Spring)**

NACT-170

Intro to Web Development

This course introduces students to designing and coding a multipage web site. Topics include an overview of the internet and web addressing, coding valid HTML and CSS, design principles, implementation on a server, and use of web development software. The use of hyperlinks, graphics, and multimedia in web pages will be covered. (NTID Supported Students.) **Lec/Lab 4, Credits 3 (Fall)**

NACT-199

Independent Study: ACT

The description for each Independent Study will be specified in each course proposal. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**

NACT-200

Help Desk Support

This course focuses on key information and proficiencies needed to support users, including troubleshooting, problem solving, successful communication, determining a client's needs, and using appropriate people skills. (Prerequisites: This class is restricted to NTID supported students who have completed NACT-151 and NACT-161 or equivalent courses.) **Lec/Lab 4, Credits 3 (Fall)**

NACT-230**Introduction to Programming**

This course introduces students to the fundamental concepts and terminology of computer programming. Emphasis will be placed on developing problem-solving skills in designing and writing simple computer programs. The course covers such topics as developing flowcharts, algorithms and pseudocode, and introduces students to variables, operators, conditional statements, looping statements, data structures, error-handling and debugging, and user interface design. The course assumes no programming background. (Prerequisites: This class is restricted to NTID supported students who have completed NACT-170 and one (1) math class NMTH-140 and above.) **Lecture 4, Credits 3 (Fall)**

NACT-235**Intro to Database Applications**

In this course students will learn to create database tables, queries, forms and reports using a leading database software product for personal computers. Students will also learn how to design a database from user specifications, and to form basic SQL commands. (NTID Supported Students.) **Lecture 4, Credits 3 (Spring)**

NACT-240**The World of Work**

The goal of the course is to provide students with the business-related skills to acquire a cooperative or permanent job, and the personal and social skills to succeed on the job. Topics related to workplace communication and relationships, as well as financial management, employer expectations, and personal goal setting will also be covered. The course will also include the development of job search skills, resume writing and interviewing, along with skills in word processing, spreadsheets and presentation software as needed in the workplace. (NTID Supported Students.) **Lecture 3, Credits 3 (Fall)**

NACT-250**Computer and Data Security**

This course will explore the unique computer and data security issues encountered by computer technicians. Using current computer security tools and procedures, students will develop more advanced skills in finding and eliminating security weaknesses, breaches, and malware programs. Computer security incident response procedures will also be introduced in this course. Hands-on lab activities will be used to reinforce concepts and to provide real-life situations that give students experience in handling suspected security breaches. (Prerequisites: This class is restricted to NTID supported students who have completed NACT-151 and NACT-161 or equivalent courses.) **Lec/Lab 4, Credits 3 (Fall)**

NACT-251**Digital Systems Integration**

This course explores the technologies of control/automated systems. Some of these technologies include, but are not limited to, the control and management of security and surveillance systems, lighting control systems, access control systems, communication systems, assistive technologies and other automated features. This course will provide a basis for connecting, configuring, testing, controlling, and maintaining these systems. (Prerequisites: This class is restricted to NTID supported students who have completed NACT-155 and NACT-160 and NACT-230 or equivalent courses.) **Lec/Lab 4, Credits 3 (Spring)**

NACT-252**Server Management and Security**

Students taking the course will learn to implement and administer network servers by managing server devices, file systems, users and groups, and application software. Students will also learn how to monitor and fine-tune server security and performance and to implement backup and fault tolerance. (Prerequisites: This class is restricted to NTID supported students who have completed NACT-151 and NACT-161 or equivalent courses.) **Lec/Lab 4, Credits 3 (Fall)**

NACT-255**A+ Certification Prep**

This course will prepare students to pass the two certification tests necessary to earn CompTIA's A+ Certification. Students will review material from previous courses and complete practice exams and troubleshooting exercises in preparation for the exam. In addition to text book(s), students will be required to purchase two certification exam vouchers for this course. To pass the course, students must pass both certification exams. (Prerequisites: This class is restricted to NTID supported students who have completed NACT-200 or equivalent courses.) **Lec/Lab 4, Credits 3 (Spring)**

NACT-260**LAN/WAN Design**

This course is designed to provide students with hands-on experience with multi-protocol routers and multi-switched networks. The class includes basic router operations, architecture, and configuration; switched Ethernet networks; virtual LAN technology; configuration of switching devices; and troubleshooting. Students set up, wire, and configure expansion technologies in an internet work environment. (Prerequisites: This class is restricted to NTID supported students who have completed NACT-161 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall)**

NACT-261**Network Security**

This course will provide students with a deeper understanding of computer and data network security. Students will examine an infrastructure design process for securing computer systems and data networks, as well as methodologies and best practices for implementing security, security policies, security testing, and incident response. The underlying principles used to secure networks including security technologies, intrusion detection, authentication, and cryptography basics will be discussed. This course will also introduce students to network security planning, technology, and organization, and the legal and ethical issues associated with network security. (Prerequisites: This class is restricted to NTID supported students who have completed NACT-161 or equivalent course.) **Lec/Lab 5, Credits 3 (Spring)**

NACT-262**Fundamentals of System Administration**

This course extends students' skills at securing and managing networks and servers. Students taking the course will practice implementing and administering networked servers in multiple operating systems by managing server devices, file system, users and groups, and application software. Students will design and test custom LAN environments, using both physical and virtual computers and servers. Students will also learn to secure shared data across platforms, securing both the physical/virtual network environment and the operating systems' shared resources. (Prerequisites: This class is restricted to NTID supported students who have completed (NACT-155 or (0805-220 and 0805-351)) and NACT-260 or equivalent courses.) **Lec/Lab 4, Credits 3 (Fall)**

NACT-265**Network+ Certification Prep**

The course will prepare students to take and pass the CompTIA's Network+ Certification exam. Students will review material from previous courses and complete practice exams and troubleshooting exercises in preparation for the exam. In addition to textbook(s), students will be required to purchase a certification exam voucher for this course. Students must pass the certification exam to pass the course. (Prerequisites: This class is restricted to NTID supported students who have completed NACT-200 and NACT-260 and NACT-261 or equivalent courses.) **Lec/Lab 5, Credits 3 (Fall)**

NACT-266**Network Defense Technologies**

This course will provide students with a deeper understanding of the technologies used to defend a network against security attacks. Students will be introduced to the concepts, principles, types, and topologies of current and future defense technologies. Various defense methodologies associated with various Intrusion Detection Systems (IDS), Intrusion Prevention Systems (IPS), and future technologies will be covered. Students will also learn best practices associated with remotely securing and accessing business resources. (Prerequisites: This class is restricted to NTID supported students who have completed NACT-260 & NACT-261 or equivalent courses.) **Lec/Lab 5, Credits 3 (Spring)**

NACT-270**Web Applications**

This course continues to build students' skills in developing well-designed webpages using the most current web development tools. By creating server-side scripts combined with embedded SQL students will be able to build professional-quality, database-driven websites. Accessibility issues related to website development will also be emphasized. Only limited programming experience is required. (Prerequisites: This class is restricted to NTID supported students who have completed NACT-170 and NACT-230 and NACT-235 or equivalent courses.) **Lec/Lab 4, Credits 3 (Spring)**

NACT-271**Client-Side Scripting**

This course is an introduction to client-side scripting for the Internet using a common scripting language. Students will be introduced to the syntax of the scripting language, and then learn to build practical and interactive client-side applications. (Prerequisites: This class is restricted to NTID supported students who have completed NACT-170 and NACT-230 or equivalent courses.) **Lec/Lab 5, Credits 3 (Fall)**

NACT-285**Undergraduate Research: Applied Computer Technology**

This course is a faculty-directed student research project at the undergraduate level. The research will entail an in-depth study in the discipline that could be considered of an original nature. Enrollment in this course requires permission from the Department Chair and completion of the NTID Undergraduate Research Contract. **Research, Credits 1 - 4 (Fall, Spring, Summer)**

NACT-289**Special Topics: ACT**

The description for each Special Topics course will be specified in each course proposal. (NTID Supported Students.) **Lec/Lab, Credits 1 - 4 (Fall, Spring)**

NACT-295**ACT Technical Capstone**

This course provides an opportunity for students to work on technical projects that integrate the skills they have developed in earlier Applied Computer Technology courses. Students will work both independently and in teams to solve "real world" networking and computer support problems in a professional manner. (Prerequisites: This class is restricted to NTID supported students who have completed NACT-170 and NACT-200 or equivalent courses.) **Lec/Lab 5, Credits 3 (Spring)**

NACT-299

Co-op: Applied Computer Tech

This course provides students with a 350-hour work experience in the computer field. Students have an opportunity to gain experience on the job, to apply what they have learned in their course work, and to evaluate their own technical, communication, and interpersonal skills. Placement assistance is provided to help students find a relevant work experience. (Prerequisites: This class is restricted to NTID supported students who have completed NACT-295 or equivalent course.) **CO OP, Credits 0 (Fall, Spring, Summer)**

Laboratory Science Technology

NLST-120

Laboratory Tools

This course introduces students to the Laboratory Science Technology (LST) program's curriculum and the laboratory tools required for success in the program and as professionals in the laboratory science field. Topics will include an introduction to historical and current issues in the field, concepts of analytical testing, basic laboratory applications, fundamental technical skills used in the laboratory, laboratory safety, laboratory notebooks and information management, scientific reference and information sources, the identification and use of laboratory equipment, maintaining a laboratory environment, concepts of quality control, and the analytical process. Students begin to organize a Laboratory Science Technology portfolio. (NTID Supported Students.) **Lec/Lab 4, Credits 3 (Fall)**

NLST-171

Fundamentals of Chemistry I

This course is an introduction to the fundamental theories and principles of chemistry governing the structure and behavior of matter at the atomic and molecular levels. The language of chemistry including nomenclature and symbolic representation is presented. Computational strategies applied to stoichiometry, reaction analysis and solution preparation are practiced. Laboratory activities focus on precision and accuracy in the collection of data. Chemical hygiene and safety procedures in the laboratory are emphasized. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Fall)**

NLST-172

Fundamentals of Chemistry II

This course is an introduction to the concepts of kinetics and thermodynamics. Chemical equilibrium and rate constants will be presented and quantified. The ideal gas law will be explored. Mathematical models will be developed and computational strategies will be applied and practiced. Laboratory activities will supplement course themes. Chemical hygiene and safety procedures in the laboratory are emphasized. (Prerequisites: This class is restricted to NTID supported students that have completed NLST-171 or equivalent courses.) **Lec/Lab 5, Credits 3 (Spring)**

NLST-199

Independent Study: LST

The description for each Independent Study request will be specified in each student/faculty proposal. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 4 (Fall, Spring)**

NLST-220

Analytical Chemistry

This course introduces quantitative analysis utilizing both gravimetric and volumetric techniques. Topics include volumetric preparation and analytical procedures, acid/base and electron transfer titrations and related computational methods, and gravimetric procedures and analyses. Standard laboratory notebook protocol will be introduced and practiced. Chemical hygiene protocol and safety procedures in the laboratory are emphasized. (Prerequisites: This class is restricted to NTID supported students that have completed NLST-171 and NLST-120 or equivalent courses.) **Lec/Lab 6, Credits 4 (Spring)**

NLST-225

Laboratory Applications

This course continues a focus on the application of laboratory tools, techniques, procedures, and scientific theory. Course topics include study of written technical procedures, technical writing, the reporting and presentation of scientific information, and topics related to the job search process and working as a professional in the field. Students synthesize information learned in previous and concurrent courses by participating in job related simulations. A Laboratory Science Technology portfolio will continue to be developed. (Prerequisites: This class is restricted to NTID supported students that have completed NLST-220 or equivalent course.) **Lab 2, Credits 3 (Fall)**

NLST-225

Laboratory Applications

This course continues a focus on the application of laboratory tools, techniques, procedures, and scientific theory. Course topics include study of written technical procedures, technical writing, the reporting and presentation of scientific information, and topics related to the job search process and working as a professional in the field. Students synthesize information learned in previous and concurrent courses by participating in job related simulations. A Laboratory Science Technology portfolio will continue to be developed. (Prerequisites: This class is restricted to NTID supported students that have completed NLST-220 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

NLST-230

Principles of Organic Chemistry

This course provides an introduction to the principles of organic chemistry. Topics include structure, nomenclature, and properties of carbon-containing molecules according to the various functional groups that are central to organic chemistry. Investigations involving chemical reactions, data collection, and qualitative and quantitative analyses provide a framework for laboratory activities. Chemical hygiene and safety procedures in the laboratory are emphasized. (Prerequisites: This class is restricted to NTID supported students that have completed NSCI-162 and NLST-172 or equivalent courses.) **Lab 3, Credits 4 (Fall)**

NLST-230

Principles of Organic Chemistry

This course provides an introduction to the principles of organic chemistry. Topics include structure, nomenclature, and properties of carbon-containing molecules according to the various functional groups that are central to organic chemistry. Investigations involving chemical reactions, data collection, and qualitative and quantitative analyses provide a framework for laboratory activities. Chemical hygiene and safety procedures in the laboratory are emphasized. (Prerequisites: This class is restricted to NTID supported students that have completed NSCI-162 and NLST-172 or equivalent courses.) **Lecture 3, Credits 4 (Fall)**

NLST-232

Laboratory Mathematics

This course addresses classic laboratory calculations and elementary descriptive statistics in the context of modern information technology and computing methods. Use of hand-held calculators and computer software to exchange, analyze and chart electronically-stored data is a central focus of this course. Study is closely coordinated with student experiences in Laboratory Science Technology courses. Topics include basic descriptive statistics with quality control applications, capture and analysis of real laboratory data, exponential and logarithmic modeling, and applications of scientific concepts. (Prerequisites: This class is restricted to NTID supported students who have completed NMTH-212 or higher or have a math placement score greater than or equal to 40 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NLST-235

Principles of Biochemistry

This course provides an introduction to the principles of biochemistry through a study of carbohydrates, lipids, amino acids, proteins, enzymes, and nucleic acids. The metabolic pathways that involve these systems will also be explored. Principles of general and organic chemistry will be emphasized through an examination of the structures, concepts, and reactions that are central to biologically important molecules. (Prerequisites: This class is restricted to NTID supported students that have completed NLST-230 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

NLST-240

Biotechnology I

This course prepares students to perform biotechnical applications in industry-specific fields of analysis. Standard methods, operating procedures, equipment/instrumentation, and protocols are introduced and reinforced. Topics include ethical issues in Biotechnology, DNA manipulation, protein analysis, tissue culture, and molecular diagnosis. Sampling, testing, and reporting in the field of biotechnology are covered. (Prerequisites: This class is restricted to NTID supported students that have completed NSCI-162 or equivalent course.) **Lab 3, Credits 3 (Fall)**

NLST-240

Biotechnology I

This course prepares students to perform biotechnical applications in industry-specific fields of analysis. Standard methods, operating procedures, equipment/instrumentation, and protocols are introduced and reinforced. Topics include ethical issues in Biotechnology, DNA manipulation, protein analysis, tissue culture, and molecular diagnosis. Sampling, testing, and reporting in the field of biotechnology are covered. (Prerequisites: This class is restricted to NTID supported students that have completed NSCI-162 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

NLST-245

Biotechnology II

This course prepares students to perform Biotechnology applications in industry, specifically as they relate to microorganisms, proteomics, and genomics. Topics include bacterial expression systems for production, purification and characterization of recombinant proteins. Study will include concepts of DNA manipulation/analysis and enzymology. Standard methods, operating procedures, and protocols are introduced and reinforced. Sampling, testing, and reporting in the fields of Biotechnology, microbiology, and molecular biology are covered. (Prerequisites: This class is restricted to NTID supported students that have completed NLST-240 or equivalent course.) **Lab 3, Credits 3 (Spring)**

NLST-245

Biotechnology II

This course prepares students to perform Biotechnology applications in industry, specifically as they relate to microorganisms, proteomics, and genomics. Topics include bacterial expression systems for production, purification and characterization of recombinant proteins. Study will include concepts of DNA manipulation/analysis and enzymology. Standard methods, operating procedures, and protocols are introduced and reinforced. Sampling, testing, and reporting in the fields of Biotechnology, microbiology, and molecular biology are covered. (Prerequisites: This class is restricted to NTID supported students that have completed NLST-240 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

NLST-250**Quantitative Instrumental Analysis**

In this course students learn and apply concepts and principles of analytical testing using laboratory instruments, instrumentation theory, and procedures. Concepts surrounding spectroscopy, electroanalytical methods, advanced and automated methods of instrumental analysis are presented. Techniques including sample preparation, instrumentation set-up and maintenance, calibration, precision measurement, safety, and data collection/analysis are introduced. Selected instrumentation presented in this course include electroanalytical meters/probes, atomic and molecular spectrophotometers, and automated instrumentation. (Prerequisites: This class is restricted to NTID supported students that have completed NLST-220 and NLST-172 or equivalent courses.) **Lecture 3, Credits 4 (Fall)**

NLST-250**Quantitative Instrumental Analysis**

In this course students learn and apply concepts and principles of analytical testing using laboratory instruments, instrumentation theory, and procedures. Concepts surrounding spectroscopy, electroanalytical methods, advanced and automated methods of instrumental analysis are presented. Techniques including sample preparation, instrumentation set-up and maintenance, calibration, precision measurement, safety, and data collection/analysis are introduced. Selected instrumentation presented in this course include electroanalytical meters/probes, atomic and molecular spectrophotometers, and automated instrumentation. (Prerequisites: This class is restricted to NTID supported students that have completed NLST-220 and NLST-172 or equivalent courses.) **Lab 3, Credits 4 (Fall)**

NLST-255**Chemical Separations and Chromatography**

In this course students learn and apply advanced concepts and principles in analytical testing using laboratory instruments/equipment, theory, and procedures as they relate to chemical separations and chromatographic methods of analysis. Techniques including sample preparation, instrumentation set-up and maintenance, calibration, precision measurement, safety, and data collection/analysis are studied. Selected techniques/instrumentation presented in this course include solid and liquid phase separations/extractions, liquid and gas chromatography, mass spectrometry, and capillary electrophoresis. (Prerequisites: This class is restricted to NTID supported students that have completed NLST-230 and NLST-250 or equivalent courses.) **Lab 3, Credits 4 (Spring)**

NLST-255**Chemical Separations and Chromatography**

In this course students learn and apply advanced concepts and principles in analytical testing using laboratory instruments/equipment, theory, and procedures as they relate to chemical separations and chromatographic methods of analysis. Techniques including sample preparation, instrumentation set-up and maintenance, calibration, precision measurement, safety, and data collection/analysis are studied. Selected techniques/instrumentation presented in this course include solid and liquid phase separations/extractions, liquid and gas chromatography, mass spectrometry, and capillary electrophoresis. (Prerequisites: This class is restricted to NTID supported students that have completed NLST-230 and NLST-250 or equivalent courses.) **Lecture 3, Credits 4 (Spring)**

NLST-260**Laboratory Methods**

This course is a capstone to the program's focus on the application of laboratory tools, techniques, procedures, and scientific theory. Professional and ethical behavior standards in the science laboratory environment and current trends in performing analyses from advanced standard methods are central to this course. Students synthesize information learned in previous and concurrent technical courses by participating in job related simulations. This course also serves as a final mechanism for Co-op preparation. Students finalize a Laboratory Science Technology portfolio. (Prerequisites: This class is restricted to NTID supported students that have completed NLST-225 equivalent course.) **Lab 2, Credits 3 (Spring)**

NLST-260**Laboratory Methods**

This course is a capstone to the program's focus on the application of laboratory tools, techniques, procedures, and scientific theory. Professional and ethical behavior standards in the science laboratory environment and current trends in performing analyses from advanced standard methods are central to this course. Students synthesize information learned in previous and concurrent technical courses by participating in job related simulations. This course also serves as a final mechanism for Co-op preparation. Students finalize a Laboratory Science Technology portfolio. (Prerequisites: This class is restricted to NTID supported students that have completed NLST-225 equivalent course.) **Lecture 2, Credits 3 (Spring)**

NLST-270**Chemical Technology**

This course prepares students to perform industry-specific applications of chemical analysis. Standard methods, operating procedures, and protocols are introduced and reinforced. Sampling, testing, and reporting in the fields of environmental, industrial, forensic, pharmaceutical, and food testing are covered. Instrumental, volumetric, and gravimetric techniques are practiced, as they relate to the fields of chemical technology. (Prerequisites: This class is restricted to NTID supported students that have completed NLST-220 and NLST-250 or equivalent courses.) **Lec/Lab 5, Credits 3 (Fall)**

NLST-285**Undergraduate Research: Laboratory Science Technology**

This course is a faculty-directed student research project at the undergraduate level. The research will entail an in-depth study of concepts related to those covered in the Laboratory Science Technology program that could be considered of an original nature. Enrollment in this course requires permission from the Department Chair and completion of the NTID Undergraduate Research Contract. **Research, Credits 1 - 4 (Fall, Spring, Summer)**

NLST-289**Special Topics: LST**

The description for each Special Topics request will be specified in each course proposal. (NTID Supported Students.) **Lec/Lab, Credits 1 - 4 (Fall, Spring)**

NLST-299**Co-op: Laboratory Science Technology**

This cooperative work experience gives students matriculated in the Laboratory Science Technology program a practical sampling of working in the field of laboratory sciences. Students will work under the supervision of qualified professionals while performing a variety of tasks pertaining to the field. **CO OP, Credits 0 (Fall, Spring, Summer)**

Leadership (NTID)**LEAD-101****Introduction to Community Leadership and Development**

This course is designed to provide a basic introduction to inclusive leadership and community development by focusing on what it means to be a good leader who facilitates community development. Emphasis in the course is on the practice of leadership. The course will examine topics such as: understanding leadership, recognizing leadership traits, engaging people's strengths, understanding philosophy and styles, attending to tasks and relationships, developing community leadership skills, creating a vision, establishing a constructive community climate, listening to outgroup members, handling conflict, addressing ethics in community leadership, overcoming obstacles, and ensuring inclusion of racial and disability justice frameworks in various community leadership approaches. Students will assess their leadership traits and skills to improve their own leadership performance. **Lecture 3, Credits 3 (Fall, Spring)**

LEAD-102**Inclusive Leadership**

Being a successful community leader requires the ability to understand and respond effectively to organizational context. This course provides a comprehensive understanding of organizations with emphasis on various approaches to organizational development. Specific focus will be placed on the workplace structure in educational, government, non-profit, and entrepreneurial environments. Finally, students will learn about methods that organizations use for accessibility and learn about organizational racial justice and disability justice. **Lecture 3, Credits 3 (Fall, Spring)**

LEAD-103**Introduction to Intersectionality**

This course will define intersectionality and review the reality of the intersection of race, class, gender and sexual identity. Students will explore how systems of oppression reinforce each other and visually see how varying identities intersect to create an overall matrix of domination. Essential to this course is understanding that there is no construction of race separate from gender, no construction of class separate from race, no construction of sexual identity separate from gender and that identity is not static but contingent, contextual, and simultaneous effect of multiple identities. (Prerequisites: LEAD-102 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

LEAD-200**Dimensions of Ethical Community Leadership**

This course provides an introduction to ethical theories, concepts, and practices as they relate to community development and inclusive leadership. Some of the topics in this course include: ethical definitions and ethical literacy, individual and group ethics, ethical principles and codes of practice, moral reasoning and behavior, ethical decision-making formats, leadership and followership, intersectionality, and accessibility. These topics will be approached through the use of ethical theories, including: Utilitarianism, Deontology/Kant's Categorical Perspective, Rawls' Justice as Fairness, Aristotelian, Confucianism, and Altruism. Students will learn how to apply these theories using a pluralistic approach. With a focus on ethical leadership experiences and decision-making, students will engage in self-analysis and reflection to develop a deeper ethical self-awareness and cultural awareness in this course. **Lecture 3, Credits 3 (Fall, Spring)**

LEAD-201**Shaping Educational and Legal Policy**

This course will provide an introduction of legal and educational policies that impact the Deaf community. The course will focus on the national and state legislative and policy making structures and processes, the Americans with Disabilities Act and related laws policy. Against the broad background of current legal policy, the course will also focus on the various styles of leadership within a range of educational settings including but not limited to: early identification and intervention, K - 12, post-secondary, and adult. This course will involve learning about educational laws and policies, including the analysis and development of mock policies. In addition, students will gain a broad understanding of how advocacy, lobbying, and political movements can lead to successful and positive results regarding the education of Deaf and hard of hearing students. (Prerequisites: LEAD-101 and LEAD-102 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

LEAD-302 **Foundation of Dialogue: Black Deaf Experiences**
A leader's ability to facilitate understanding, inclusion, and resolution is key to leading a group to success. Honoring and valuing Black and Black Deaf people's experiences are critical to creating an inclusive, empowering and effective work group. During classroom dialogue, students will actively participate in structured discussions with students and learn from each other's perspectives, read and discuss relevant reading material, and explore avenues to resolution. Students may apply knowledge gained through dialogue and readings to lead agencies and organizations to inclusive change. Students will also explore ways of taking action to create change and bridge differences through readings, journals, leading a dialogue and a final written paper. (Prerequisite: LEAD-200 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

LEAD-300 **Rhetoric of Leadership**
Students master the elements of rhetoric and become adept at strategies for successfully conveying valuable knowledge and a leadership vision that persuades readers and motivates organizations. Beyond the Aristotelian rules of communication, students learn powerful and innovative techniques drawn from multiple sources, including media and visual narratives. Each student produces written projects and oral presentations, and each student receives critical feedback and individual support as well as workshop team input and top visitor expertise. Through exploration of rhetorical perspectives and practices of leadership, students will be able to understand, analyze, and evaluate rhetoric's potential relationships to experiences and practices of contemporary leadership. Furthermore, students will demonstrate ability to engage in rhetorical leadership by adopting at least one communication strategy to connect with their intended audiences. **Lecture 3, Credits 3 (Fall, Spring)**

LEAD-301 **Social Media Communication and Leadership**
This course focuses on social media technologies and communication used by leaders and organizations in the United States and globally. Students will examine various social media platforms, including Facebook, Twitter, Instagram, YouTube, and LinkedIn, and evaluate the security, privacy, ethics, and accessibility possibilities for each. Through experiential learning, students will build their own social media brands, content, and hashtags, using current trends, theories, and tools, including tools of accessibility and inclusion, to welcome a diverse network of followers. An analysis of how social media technologies have impacted organizational development, political activism, social justice, the economy, and news consumption, will inform students about social media advantages and disadvantages, as well as etiquette, best practices, and do's and don'ts. This course will provide students with the opportunity to experience how people with various disabilities access social media to guide management on best practices in accessibility, and review case studies of diversity and inclusion in social media to engage with followers/audiences from various cultural, racial, and ethnic backgrounds. **Lecture 3, Credits 3 (Fall or Spring)**

LEAD-302 **Community Development in Athletics**
This course offers a unique perspective into leadership within the sports community. Students will learn about sports philosophy, characteristics of athletic leadership, and group dynamics. Team communication strategies and the cultivation of community of athletes will also be discussed. **Lecture 3, Credits 3 (Fall, Spring)**

LEAD-303 **Literatures of Intersectionality**
Leaders of social justice movements work towards visions of a better world—one that dismantles systemic barriers and injustices. This course will turn to intersectional fiction writing to examine how literature can contribute to social justice movements. In other words, we will ask how reading literatures of intersectionality may foster social justice movements. In doing so, we will situate contemporary intersectional literature in their historical contexts—looking to the theory and writing of feminist women-of-color, queer studies, disability studies, Indigenous studies, and Deaf studies. We will read some of these theories as literature and literature as theory—with attention to interlocking forms of oppression and privilege. **Lecture 3, Credits 3 (Fall, Spring)**

LEAD-304 **Conflict Resolution: Negotiation and Mediation**
This skills-oriented course introduces theories and practices of conflict resolution and provides basic training in mediation, negotiation, and facilitation. In addition to examining the strengths and weaknesses for each of these conflict resolution methods, this course orients students to specific tools commonly used in each to manage conflicts, such as identifying the zone of possible agreement (ZOPA), developing BATNAs (best alternative to a negotiated agreement), and performing SWOT Analyses (Strengths, Weaknesses, Opportunities, Threats). Through the use of case studies, simulations, role-plays, and reflective practice, students will learn how to manage power imbalances and ethical dilemmas, address needs for accommodations, and adapt for cultural differences. Students will learn a range of transferable skills for managing interpersonal, organizational, and community disputes. **Lecture 3, Credits 3 (Fall, Spring)**

LEAD-305 **International Deaf Leadership and Community Development**
The challenges and opportunities for deaf community development vary from one country to another. This course focuses on the skills and best practices for deaf community leaders to implement in their countries of origin. Students will be introduced to international laws that support deaf and their communities. The achievements of past and current international deaf community leaders will be studied and used as a model for identifying the needs of communities and mobilizing community action. This course is designed for international and domestic students who are committed to making positive organizational changes. (Prerequisites: LEAD-306 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

LEAD-306 **Leadership in the Deaf Community**
This course will introduce historical and current issues regarding leadership and the Deaf/Hard of Hearing (D/HH) community. Students will learn about D/HH leaders in the Deaf community over the years, examine movements that have impacted the lives of D/HH individuals, and finally, learn about influential organizations of, by, and for D/HH individuals. **Lecture 3, Credits 3 (Fall, Spring)**

LEAD-307 **Leadership and Accessible Technology**
This course equips students with tools for understanding principles and uses of accessible technologies, such as captioned media, mobile applications, and voice recognition software, with a focus on how deaf and hard-of-hearing leaders and organizations work to ensure access to communication. This course is built on the framework of access as a continual process in which users advocate for the needs of their community. This course establishes the legal requirements that mandate access technologies, such as captioned media, and reviews how leaders have campaigned for increased access to media. These underlying principles inform the course's overriding exploration of the benefits and limitations of current technologies that may not be fully accessible; how current leaders and leading organizations utilize access technologies to facilitate signed, spoken, and written communication; and current work on the next generation of access technologies. The readings, assignments, and discussions in this course will encourage students to recognize how access technologies can support individuals as well as how leaders can serve as advocates who work to fight for improved access to communication and other resources in their communities. **Lecture 3, Credits 3 (Fall, Spring)**

LEAD-308 **Current Trends in Community Development and Leadership**
This course includes an overview of the current trends in community development and leadership. Content includes best practices and topics for community development and leadership, as well as pertinent laws, policies, resources and information. Students will participate in and critique a designated set of lectures, roundtable discussions and presentations on topics covering current trends in community development and inclusive leadership. The goal is to engage students in discussion of current trends with their peers and with experts in the field. **Lecture 3, Credits 3 (Fall, Spring)**

LEAD-309 **Dialogue: Race and Ethnicity**
This course will include an overview of the history of current race & ethnic relations in the United States, including the Deaf community. It will provide students with advanced skills in planning, evaluating and leading group discussions needed to create and empower working groups in the community, education or on the job, to achieve their organizational goals. Students will be challenged to apply these skills by engaging in discussion about critical and contemporary issues experienced by people of color and diverse ethnicities to facilitate understanding and resolution between members of diverse working groups. During classroom dialogue, students will actively participate in structured discussions with students and learn from each other's perspectives. Students will explore avenues for resolution. Students will use readings, journals, discussions, and a final written paper to explore ways of taking action to create change and bridge differences. (Prerequisites: LEAD-203 or equivalent course.) **Lecture 3, Credits 3 (Fall or Spring)**

LEAD-310 **Dialogue: Gender**
An overview of the history of gender and its evolution in American society will be provided. Students will be challenged to apply dialogue skills by engaging in discussion about critical and contemporary issues experienced by different genders to facilitate understanding and resolution between members of diverse working groups. During classroom dialogue, students will actively participate in structured discussions with students and learn from each other's perspectives, read and discuss relevant reading material, and explore avenues to resolution. Students will also explore ways of taking action to create change and bridge differences through readings, journals, leading a discussion and a final reflection paper. (Prerequisites: LEAD-203 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

LEAD-311**Dialogue: Deaf, DeafBlind, DeafDisabled, Hard-of-Hearing**

A history of the Deaf, Deafblind, DeafDisabled and Hard-of-Hearing communities and their relationship with the American society will be discussed. This course will challenge students to apply group skills by engaging in discussion about critical and contemporary issues experienced by deaf, deafblind, deafdisabled, or hard-of-hearing communities to facilitate understanding and resolution between members of diverse work groups. During classroom dialogue, students will actively participate in structured discussions with students and learn from each other's perspectives, read and discuss relevant reading material, and explore avenues to resolution. Students will also use readings, journals, discussions, and a final reflection paper to explore ways of taking action to create change and bridge differences. (Prerequisites: LEAD-203 or equivalent course.) **Lecture 3, Credits 3 (Fall or Spring)**

LEAD-312**Dialogue: LGBTQIA**

An evolution of the LGBTQIA movement and intersectionality will be covered. This course will challenge students to apply group skills by engaging in discussion about critical and contemporary issues experienced by LGBTQIA communities to facilitate understanding and resolution between members of diverse work groups. During classroom dialogue, students will actively participate in structured discussions and learn from each other's perspectives, read and discuss relevant reading material, and explore avenues to resolution. Students will also use readings, journals, leading a discussion and a final reflection paper to explore ways of taking action to create change and bridge differences. (Prerequisites: LEAD-203 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

LEAD-313**Dialogue: Social Class**

An overview of class and privilege in American society will be provided in this course. In a socially diverse organization, an effective leader must develop the talent of harnessing the skills and contributions of each of its members to achieve its goals. Classism and privilege have precluded many people from access to or full participation in many educational, professional, and community-based organizations. Developing skills to discuss issues of classism and privilege is critical to any work group's effectiveness. A leader's ability to facilitate understanding and resolution is key to leading the group to success. Working to establish a just work group as well as empowering and valuing diverse abilities and experiences are critical to creating inclusive and effective work groups. (Prerequisites: LEAD-203 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

LEAD-350**Introduction to Qualitative Research**

This course will provide an introduction for students to learn various types of qualitative research in the field of leadership, intersectionality, and accessibility. This course will involve hands-on experiences, developing research questions, interviewing, performing thematic analyses, and identifying vital components of a qualitative research study. (This class is restricted to students with at least 3rd year standing in LEAD-BS.) **Lecture 3, Credits 3 (Fall, Summer)**

LEAD-351**Introduction to Quantitative Research**

This course will introduce students to quantitative methods used within the social sciences to answer research questions. Students will learn how to conduct culturally appropriate research with deaf and hard-of-hearing (DHH) individuals and Deaf communities and organizations. Students will learn about how to define and measure variables of interest, design surveys and other types of research studies, analyze the data collected, report outcomes, manage data safely, and conduct ethically responsible and culturally authentic research. (Prerequisites: C- or better in STAT-145 or NMTH-250 or equivalent course and students in LEAD-BS with at least 3rd year standing.) **Lecture 3, Credits 3 (Spring)**

LEAD-500 Experiential Learning in Community Development and Inclusive Leadership

The experiential learning (EL) requirement may be fulfilled through a variety of methods, such as co-op, undergraduate research, summer research experiences, study abroad relevant to the major, or another activity approved by the experiential learning coordinator. (Prerequisites: C- or better in LEAD-350 and LEAD-351 or equivalent courses.) **CO OP, Credits 0 (Fall, Spring, Summer)**

LEAD-501**Capstone Seminar**

Students will conclude their study in the LEAD program by developing a professional portfolio and proposing an area for further examination. The research proposal will investigate current issues in community development and inclusive leadership. Applying knowledge gained from their coursework and their completed experiential learning opportunity, students will develop, write, and present a research proposal. Students will also prepare themselves for future employment and/or continued education at the graduate level by designing a professional e-portfolio. This document will allow students to demonstrate the range of activities and assignments they have undertaken in the LEAD degree program. (Prerequisite: LEAD-500 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

Liberal Studies**NDLS-150****Introduction to Antiracism**

This course provides a basic introduction to antiracism and the ethical frameworks and practices of social justice and racial justice. Topics in the course will include colonization, power, privilege, oppression, marginalization, intersectionality, individual racism, systemic racism, white supremacy and antiracism, and will be approached through the use of theoretical frameworks, such as transformative justice, ethical leadership, racial equity and inclusion. With a focus on ethical decision-making, students will engage in self-analysis and reflection to develop deeper self-awareness in the areas of power and privilege, and to produce lasting and meaningful social change through the practice of antiracism. **Lecture 3, Credits 3 (Fa/sp/su)**

NDLS-200**Introduction to Group Advocacy**

The course is designed to assist students in understanding and implementing ways in which they can advocate for deaf and hard-of-hearing persons in their communities. Concepts of leadership and group advocacy models and issues relevant to deaf and hard-of-hearing communities will be covered. Students will explore community development and practical applications pertaining to group and systemic advocacy frameworks. Students will examine international and national policies and their effectiveness in supporting deaf and hard-of-hearing communities. (Prerequisite: LEAD-200 or equivalent course.) **Lecture 3, Credits 3 (Fall, Summer)**

NDLS-256**Travel and the Imagination**

Using written texts, film, and photography, this class introduces students to the genres of travel as they reflect the literary and visual imagination. The local and the exotic as presented by authors, directors, and photographers will be explored through visual and literary texts that present the people, cultures and histories of sites around the world, narrated from the individual perspective. Students will read of journeys that invoke the psychological as well as the physical experience of travel, experiences that serve as metaphors for life journeys. Discussions will also center on the ways in which travelers bring a particular, and often western, lens to the places they describe. Discussions will lead to the inter-connections among cultures and peoples as they enter the current global, economic, and political stage. (NTID Supported Students.) **Lecture 3, Credits 3 (Fall, Spring)**

NDLS-280**International Studies Seminar**

The International Studies Seminar provides students with the opportunity to learn about the unique historical, geographical, economic, social, and political circumstances of a country other than the United States, and consider those factors that shaped the relationship between the country being studied and its Deaf community. The course will foster a connection between NTID students and the country being studied by introducing students to the spoken and signed languages of the selected country as well as to members of the Deaf community in the country via videoconferencing. The country to be studied, and the specific course topics for that country, will vary by instructor. This course will also serve as preparation for participation in a NTID faculty-led experience and/or project in the country that is the focus of the Seminar. Specific knowledge and skills required for this experience and/or project abroad will also be taught. This course is required for students participating in the NTID faculty-led experience and/or project abroad, but participation in the experience/project abroad is optional. (Prerequisites: This class is restricted to NTID supported students with at least 2nd year standing.) **Lecture 3, Credits 3 (Fall, Spring)**

NDLS-285**Undergraduate Research: Liberal Studies**

This course is a faculty-directed student research project at the undergraduate level. The research will entail an in-depth study in the discipline that could be considered of an original nature. Enrollment in this course requires permission from the Department Chair and completion of the NTID Undergraduate Research Contract. **Research, Credits 1 - 4 (Fall, Spring)**

NDLS-289**Special Topics: Liberal Studies**

The description for each Special Topics course will be specified in each course proposal. **Lec/Lab, Credits 1 - 4 (Fall, Spring)**

Mathematics (NTID)**NMTH-110****Prealgebra**

Improves students' fundamental understanding of and skills in mathematics. Concepts covered include fractions, decimals, percents and ratios. Students are introduced to signed numbers, variables, algebraic expressions and equations, simple geometric formulas, and graphing. Instruction emphasizes the use of English and ASL as they relate to basic mathematical operations. (This class is restricted to NTID supported students that have a math placement score equal to 10.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

NMTH-140**Mathematics in Society**

This project-based course is intended for students interested in the exploration of mathematical thinking and procedures. It includes applications to real world situations and uses problem solving skills. Topics include number sense, consumer mathematics, introduction to statistics, basic geometry, number representation, and units of measurement including conversion in English and metric systems. (Prerequisites: This class is restricted to NTID supported students that have completed NMTH-110 or have a math placement score equal to 20, 25 or 30 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NMTH-180**Foundations of Algebra**

An introductory algebra course consisting of a blended lecture/lab component in which the basics of evaluating algebraic expressions, solving linear equations and inequalities and graphing linear functions are studied. The Pythagorean Theorem and systems of linear equations are also studied. Students cannot earn credit for both NMTH-180 and NMTH-245. (Prerequisites: This class is restricted to NTID supported students that have completed NMTH-110 with a C- or better or have a math placement score equal to 20 or 25 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NMTH-199**Independent Study: Mathematics**

The description for each Independent Study request will be specified in each student/faculty proposal. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 4 (Fall, Spring)**

NMTH-206**Trigonometry for Coordinate Analysis**

Students will study right triangle trigonometry with an emphasis on concepts and applications related to computer integrated machining technology (CIMT). Topics include trigonometric ratios in right triangles, coordinate geometry calculations, circle properties, simple and complex machine applications, and 3-D coordinate geometry. (Prerequisites: This class is restricted to NTID supported students who have completed NMTH-180 or higher or have a math placement score greater than or equal to 30 or equivalent course.) **Lec/Lab 4, Credits 3 (Spring)**

NMTH-210**Applications of Algebra**

An intermediate algebra course consisting of a lecture and a lab component in which exponents, rational expressions, polynomials, roots and radicals, and non-linear functions are studied. Students cannot earn credit for both NMTH-210 and NMTH-212. (Prerequisites: This class is restricted to NTID supported students who have completed NMTH-180 with C- or better or have a math placement score equal to 30 or 35 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NMTH-212**Integrated Algebra**

An intermediate algebra course consisting of a blended lecture/lab component in which non-linear functions and graphs, systems of linear equations, exponents, polynomials, roots, radicals and properties of the complex numbers are considered. There is significant emphasis on scientific and geometric models, as well as the use of graphing utilities. Students cannot earn credit for both NMTH-210 and NMTH-212. (Prerequisites: This class is restricted to NTID supported students who have completed NMTH-180 with C- or better or have a math placement score equal to 30 or 35 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NMTH-220**Trigonometry**

Topics include the trigonometric ratios, radian measure, angles in a coordinate system, ratio values for special angles, trigonometric inverses, graphs of trigonometric functions, and trigonometric identities and equations (Prerequisites: This class is restricted to NTID supported students that have completed NMTH-212 or higher or have a math placement score equal to 40 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NMTH-245**Accelerated Algebra I**

The first of a two-course sequence of accelerated courses for students who are interested in acquiring the skills necessary for an introductory-level calculus course. The topics include a review of the fundamentals of algebra and solving linear equations and inequalities in both 1- and 2-variables algebraically and graphically. Exponents, polynomial/quadratic functions and their graphs are also studied. Students cannot earn credit for both NMTH-245 and NMTH-180. (Prerequisites: Students must have an NTID Reading score greater than or equal to 125 and a NTID Math score equal to 25.) **Lec/Lab 5, Credits 4 (Fall)**

NMTH-250**Elementary Statistics**

An introductory statistics course utilizing a lecture/lab format in which statistics concepts, probability, probability distributions, and bivariate data are studied. Statistical concepts that are essential for an understanding of social and political issues of contemporary life will be emphasized. Statistical software and applications will be introduced. (Prerequisites: This class is restricted to NTID supported students that have completed (UWRT-100 or 150 or 0502-111) and NMTH-210 or higher with a grade of C- or better or have a math placement score greater than or equal to 40 or equivalent courses.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NMTH-255**Introduction to Discrete Mathematics**

This course utilizes a lecture/lab format to introduce discrete mathematics topics such as logic, sets, number systems, counting, functions, graph theory, sequences and recursion. The applications of these topics to various topics in computing will be emphasized. (Prerequisites: This class is restricted to NTID supported students who have completed UWRT-100 or UWRT-150 and NMTH-212 or higher or have a math placement score greater than or equal to 40 or equivalent courses.) **Lec/Lab 4, Credits 3 (Spring)**

NMTH-260**Explorations in College Algebra**

Students will study topics from algebra with an emphasis on functions and graphs. Topics include the algebra of functions and the study of inverse functions. Rational, radical, exponential and logarithmic functions and systems of linear equations are also studied. Students, who earn credit for NMTH-260, cannot take NMTH-272 or NMTH-275. (Prerequisites: This class is restricted to NTID supported students that have completed NMTH-210 or equivalent course with a grade of C- or better or have a math placement score greater than or equal to 40.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NMTH-272**Accelerated Algebra II**

The second of a two-course sequence of accelerated courses designed for students who intend to continue into calculus. This course provides an in-depth treatment of solving equations, inequalities, and systems of equations; function properties, graphs, and applications; and the study of linear, quadratic, rational, radical, exponential, logarithmic, inverse and piecewise-defined functions. Students, who earn credit for NMTH-272, cannot take NMTH-260 or NMTH-275. (Prerequisites: This class is restricted to NTID supported students that have completed NMTH-245 or equivalent course with a grade of C- or better or have a math placement score greater than or equal to 35.) **Lec/Lab 5, Credits 4 (Fall, Spring)**

NMTH-275**Advanced Mathematics**

Topics from precalculus mathematics are studied with an emphasis on functions and graphs. Topics include the algebra of functions and the study of inverse functions. Rational, exponential, logarithmic and piecewise-defined functions are among those studied. Students, who earn credit for NMTH-275, cannot take NMTH-260 or NMTH-272. (Prerequisites: This class is restricted to NTID supported students that have completed NMTH-212 or equivalent course with a grade of C- or better or have a math placement score greater than or equal to 40.) **Lecture 4, Credits 3 (Fall, Spring)**

NMTH-285**Undergraduate Research: Mathematics**

This course is a faculty-directed student research project at the undergraduate level. The research will entail an in-depth study in mathematics or statistics that could be considered of an original nature. Enrollment in this course requires permission from the Department Chair and completion of the NTID Undergraduate Research Contract. **Research, Credits 1 - 4 (Fall, Spring, Summer)**

NMTH-289**Special Topics: Mathematics**

The description for each Special Topics request will be specified in each proposal. (NTID Supported Students.) **Lec/Lab, Credits 1 - 4 (Fall, Spring)**

Mobile Application Development (NTID)**NMAD-155****Survey of Emerging Visual Design**

This course focuses on the industry-standard tools used to create the visual elements of user interfaces for varying screen sizes and devices. Students in this course will identify common design elements and the techniques used to create these elements. Applying the design concepts, principles, theories and techniques learned in this course will increase students' ability and preparation to design future interfaces that are intuitive and user-friendly. Students are expected to deliver projects with good application of responsive design layouts, typography, color, and other graphics. (NTID Supported Students.) **Lec/Lab 4, Credits 3 (Fall)**

NMAD-180**Programming Fundamentals I: Mobile Domain**

This course will provide students with a study of the fundamental concepts, logical structures, and algorithms inherent to computer programming. Students will learn how to write basic object-oriented programs in a contemporary programming language with a focus on mobile application development. (NTID Supported Students.) **Lec/Lab 6, Credits 4 (Fall)**

NMAD-181**Programming Fundamentals II: Mobile Domain**

This course builds upon the programming skills developed in Programming Fundamentals I Mobile Domain and will cover more advanced object-oriented programming concepts, logical structures, and algorithms. Visual information system modeling, graphical user interfaces and software testing topics will also be covered. Students will be working individually on mobile-related projects as well as working with other students in team-based projects. (Prerequisites: This class is restricted to NTID supported students that have completed NMAD-180 or equivalent course.) **Lec/Lab 6, Credits 4 (Spring)**

NMAD-182**Software Analysis and Design**

Building on the fundamentals of programming, students will learn important topics related to object-oriented design. Topics such as class design, unified modeling language, inheritance, composition, logic building, implementation, design strategies, and testing are emphasized. Upon completion, students will be able to demonstrate an understanding of the software development life cycle including a thorough analysis and design of a real-world software problem. (Prerequisites: This class is restricted to NTID supported students that have completed NMAD-180 or equivalent course.) **Lec/Lab 5, Credits 3 (Spring)**

NMAD-199**Independent Study**

The description for each Independent Study will be specified in each course proposal. (NTID Supported Students.) **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**

NMAD-250**Mobile User Experience**

This course will help students develop a better understanding of the user experience and interaction in the mobile domain. Students will plan and execute various mobile design strategies with usability as the forefront of design. Students will apply best practices in gathering data from usability testing and conduct analysis to make changes that will lead to effective user interfaces. This course will also discuss universal design experiences to provide full accessibility for all users. (Prerequisites: This class is restricted to NTID supported students that have completed NMAD-155 or equivalent courses.) **Lec/Lab 4, Credits 3 (Spring)**

NMAD-252**Mobile User Interfaces**

User-centered, interactive design is critical to the development of successful consumer, commercial, industrial or defense-level devices and software, particularly for mobile devices. This course provides students with a solid foundation in developing and understanding a comprehensive range of experiences in user-centered interactive design. The course will cover effective communication principles, user interface design techniques, design tools, workflow, design process, and user interaction. This course will include discussion of universal design principles to provide full accessibility for all users. (Prerequisite: NMAD-250 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall)**

NMAD-260**Mobile App Development I**

This course introduces mobile application development utilizing modern development tools to build apps on popular mobile platforms using a contemporary programming language. Students will learn and apply code-sharing techniques to create mobile applications in an efficient manner. This course will also examine mobile development tools, native UIs, navigation, and design patterns to build and publish mobile apps. (Prerequisites: This class is restricted to NTID supported students that have completed NMAD-181 and NMAD-182 or equivalent courses.) **Lec/Lab 6, Credits 4 (Fall)**

NMAD-261**Mobile App Development II**

This course builds upon the cross-platform development skills developed in Mobile App Development I and will cover more advanced topics such as geolocation, web services, data acquisition, portable class libraries, shared projects, notifications, and other advanced APIs. Students will be expected to create and publish fully functional apps across multiple platforms. (Prerequisites: This class is restricted to NTID supported students that have completed NMAD-260 or equivalent course.) **Lec/Lab 6, Credits 4 (Spring)**

NMAD-262**Web Services and Data Storage Technologies**

Students learn how to consume server-side web services that can deliver data in different formats to a variety of applications by building on their previous experience with websites and applications. They use a hands-on approach to build and modify different types of databases for use with their web services while exploring how data can and why it should be shared by multiple devices and applications. Students also gain an understanding of how to detect different devices over the Internet and generate specific targeted content. Use of pre-existing components, APIs and frameworks to improve efficiency is also explored. Methods for efficient data-transfer, to increase battery life, are a key topic in this course. Students work individually, as well as with other students, to complete tasks. (Prerequisites: This class is restricted to NTID supported students that have completed NMAD-260 or equivalent course.) **Lec/Lab 5, Credits 3 (Spring)**

NMAD-285**Undergraduate Research: Mobile Application Development**

This course is a faculty-directed student research project at the undergraduate level. The research will entail an in-depth study in the discipline that could be considered of an original nature. Enrollment in this course requires permission from the Department Chair and completion of the NTID Undergraduate Research Contract. **Research, Credits 1 - 4 (Fall, Spring, Summer)**

NMAD-289**Special Topics**

The description for each Special Topics course will be specified in each course proposal. (NTID Supported Students.) **Lec/Lab, Credits 1 - 4 (Fall, Spring)**

NMAD-290**Mobile Applications Development Capstone Projects**

Working in teams, students experience the analysis, design, implementation, testing and deployment of a mobile solution for a real-world client. Important topics from throughout their program of study are applied in this course. Faculty advisors facilitate student teams to demonstrate their skills in the applied project. Student teams make a technical presentation to their faculty advisors and participate in a public showcase of projects. (Prerequisites: This class is restricted to NTID supported students that have completed NMAD-261 and NMAD-262 or equivalent courses.) **Lec/Lab 5, Credits 3 (Fall)**

NMAD-299**Mobile Application Development Co-op**

This course provides students with a 350-hour work experience in the computer field. Students have an opportunity to gain experience on the job, to apply what they have learned in their course work, and to evaluate their own technical, communication, and interpersonal skills. Placement assistance is provided to help students find a relevant work experience. (Prerequisites: This class is restricted to NTID supported students that have completed NACT-240 and NMAD-261 and NMAD-262 or equivalent courses.) **CO OP, Credits 0 (Fall, Spring, Summer)**

Performing Arts (NTID)**PRFN-098****Experiential Learning in Performing Arts**

This course provides hands-on experiential learning in Performing Arts, which may be fulfilled through a variety of methods related to production activities. Such activities may include light board operator, sewing buttons on costumes pieces, and helping paint scenic elements. All experiences must be approved by a department mentor. **Lec/Lab, Credits 0 (Fall, Spring)**

PRFN-100**Introduction to Performing Arts**

This course will examine the characteristics and elements of theatre and the performing arts, emphasizing the principles and conventions that guided theatre productions through history. The course examines the ways that theatre influences and is influenced by cultures and by individual life experience. Particular attention is paid to the development of scripts, visual theatre, theatre vocabulary, and the emergence of Deaf and multicultural theatre. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

PRFN-102**Introduction to Stagecraft**

This course introduces students to the technical and design processes of theatre, including scenery, costume, lighting, make-up, and prop craft. Students experience the range of skills needed to create successful productions, and identify their own areas of interest and strength for future theatre participation. **Lecture 3, Credits 3 (Fall)**

PRFN-111**Sign Mime, Creative Movement, and Visual Theatre**

This course expands students' understanding of the use of physical space through creative movement strategies. These are supplemented by images, gesture, and sign representation of story elements. Techniques developed from visual theatre practices are studied. Through active participation, students learn the language of movement, mime and visual theatre. Ensemble work based on performance standards, character creation, and theme development is emphasized. **Lecture 3, Credits 3 (Fall, Spring)**

PRFN-199**Independent Study: Performing Arts**

The description will be specified on each Independent Study Contract. **Ind Study, Credits 1 - 3 (Fa/sp/su)**

PRFN-200**Appreciation of Theatrical Design**

This course fosters the understanding and appreciation of design as part of theatrical productions with specific reference to the fields of scenic, lighting, and costume design and the personnel involved. Students will explore the historical and cultural aspects of theatre while examining the relationship to their activities in everyday life. Students will learn how theatrical scripts and stage directions influence the design, aesthetics, and use of space in a theatrical production, and how to use the script to visualize the design process. Deaf Theatre and other cultural references will be used to discuss the ever growing need to address diversity and accessibility in theatrical productions. Emphasis will be placed on using literary analysis of themes and metaphors inherent in a script to develop an appreciation for the artistic and aesthetic aspects of technical theatre. No artistic or technical skills necessary. **Lecture 3, Credits 3 (Fall, Spring)**

PRFN-201**Appreciation of Media in Performance**

This course fosters the understanding and appreciation of the integration of media to support and enhance storytelling in theatre, dance, and experimental performances. Focus will be placed on the study and appreciation of media in performance through an exploration of theory, historical perspectives, and creative expression. Examples of media from early integration to current practices will be explored, as well as the various types of technology and equipment used. Deaf Theatre and other cultural references will be used to discuss the need to support accessibility and create inclusive environments. Instances where media and technology were used to push the boundaries, as well as to develop and test new technology, will also be examined. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

- PRFN-204** **Scenic Painting and Props**
This course is an introduction to the methods and materials of theatrical painting and props through a project-oriented class. Techniques, communication, and use of appropriate materials and tools are emphasized. Students apply the skills learned to individual and group projects. This course prepares students for more specialized work in Theatre Practicum. **Lecture 3, Credits 3 (Fall, Spring)**
- PRFN-206** **Stage Makeup**
This course introduces students to the principles and techniques associated with theatrical stage makeup. Through practical application and experimentation, students will be encouraged to explore a variety of methods, materials, and possibilities for a range of character types; including fantasy and special effects makeup techniques. Students will be provided lectures, handouts, and class and video demonstrations throughout the semester. **Lec/Lab 4, Credits 3 (Fall or Spring)**
- PRFN-207** **Appreciation of Theatrical Costumes**
This course is designed as an introduction to the theory and application of costume and accessory design for the stage. Students will explore the artistic, historical, and technical aspects of creating costumes and accessories, learning about key vocabulary, equipment, and materials used in costume technology. Influences on design theory will be examined through examples from Deaf Theatre and cultural, physical, and visual-based performances. Students will gain an appreciation for the relationship that costumes and accessories contribute to the overall meanings of dramatic performance. **Lecture 3, Credits 3 (Fall or Spring)**
- PRFN-208** **Appreciation of Theatrical Scenery**
This course introduces students to the study and appreciation of technical theatre through an exploration of theory, historical perspectives, and creative expression of theatrical scenery. Students will explore the principles, techniques, and tools used in creating scenery. Attention will also be placed on the evolution of theatrical scenery throughout time, theories and application of design elements, and the impact of the growth of technology over the last century. Influences on design theory will be examined through examples from Deaf Theatre and cultural, physical, and visual-based performances. **Lecture 3, Credits 3 (Fall or Spring)**
- PRFN-209** **Appreciation of Theatrical Lighting**
This course introduces students to the study and appreciation of technical theatre through an exploration of theory, historical perspectives, and the creative expression of theatrical lighting. Influences on design theory will be examined through examples from Deaf Theatre and cultural, physical, and visual-based performances. Students will explore conventional lighting equipment and techniques used in creating lighting effects for theatrical productions. The evolution of lighting uses throughout time and the impact of the exponential growth of lighting technology over the last century will also be covered. **Lecture 3, Credits 3 (Fall or Spring)**
- PRFN-210** **Acting II**
This course is a second-level course in the development of college student actors. This course covers advanced acting techniques and vocabulary, both for developing the actor's craft and for understanding the practical theatrical jargon used by professionals. Particular attention is paid to the physical, emotional, and mental actions an actor reveals to his/her audience. Development of script translation technique related to character development is also emphasized. Practical attention is given in preparing the student actor to enter the entertainment industry or community theatre with viable working skills. (Prerequisites: PRFN-110 or equivalent course.) **Lecture 3, Credits 3 (Spring)**
- PRFN-211** **Acting with Physical Expression**
This course introduces students to the actor's craft, process, and technique. Major performance methods are introduced in both physical approaches to acting (Grotowski, Delsarte, Alexander technique, multi-cultural methods from African Griot to Japanese Noh) and psychological approaches (Stanislavsky, Meisner, Hagan, Strasberg). Foundation skills in translation, memorization, stage combat, mask, and mime prepare the student upper-level performance courses. **Lec/Lab 4, Credits 3 (Fall, Spring)**
- PRFN-218** **Theatre Practicum**
This course applies technical, performing, script analysis, stage management, and other skills to an actual theatrical production. Students contract with a department mentor for responsibilities and the appropriate credit expectations. In addition to production responsibilities, students are expected to complete reading and writing assignments connected to the production. This course is repeatable for credit. (Enrollment in this course requires permission from the department offering the course.) **Lec/Lab, Credits 1 - 3 (Fall, Spring)**
- PRFN-219** **Seminar in Performing Arts**
This course gives students the opportunity for focused, in-depth study of a selected advanced topic in theatre, using seminar and workshop approaches. Specific topics vary from semester to semester, and address such areas as methods of acting, playwriting, production design, systems of analysis, genres of dance, translation, and historical influences on theatre art. This course is repeatable for credit. **Lecture 3, Credits 3 (Fall, Spring)**
- PRFN-240** **Dance History**
This course explores the evolution of dance from early movement to the diverse representation of dance found in the world today. Emphasis will be placed on the study and appreciation of dance through an exploration of theory, history, and the perspective of cultural and social impacts, along with traditional and experimental dance forms. Students will experience and reflect on a survey of dance forms through lectures, discussions, literature references, and viewings of film and live performance. **Lecture 3, Credits 3 (Fa/sp/su)**
- PRFN-243** **Dance: Jazz**
This course introduces students to the study and appreciation of jazz dance through an examination of movement concepts, artistic principles, and the exploration of theory, history, and socio-cultural perspectives. Students will explore various styles of jazz such as Broadway, Street, and Contemporary. Emphasis will be placed on body isolations and rhythmic phrasing to help students develop an appreciation for jazz dance as an art form. Students will discover new capabilities regarding flexibility, strength, coordination, balance, and their comprehension of jazz dance in relation to music, space, time, and energy. Through practice and application, students will develop a physical appreciation of dance from the experience of movement and creative expression. Learning about jazz dance performance and history through the use of images, video, practice, and discussions as well as reading and writing assignments will be part of the course. **Lec/Lab 4, Credits 3 (Fall or Spring)**
- PRFN-244** **Dance: Hip Hop**
This course introduces students to the study and appreciation of hip hop through an exploration of theory, historical and aesthetic foundations, and socio-cultural perspectives. Students will experience a variety of movement qualities, develop techniques for proper body stretching and conditioning, and be exposed to basic hip hop styles and trends. Students will discover new capabilities regarding flexibility, strength, coordination, balance and their comprehension of hip hop dance in relation to music, space, time and energy. Through practice and application, students will develop a physical appreciation of dance from the experience of movement and creative expression. Learning about hip hop dance performance and history through the use of images, video, practice and discussions as well as reading and writing assignments will be part of the course. **Lec/Lab 4, Credits 3 (Fall or Spring)**
- PRFN-246** **Dance: Modern**
This course is designed as an introduction to dance as a developmental, expressive, and creative art form. Students will learn how the artistic principles and movement concepts of: basic rhythms, dance technique, improvisation and beginning choreography; impact the creation and execution of modern dance. Students will discover new technical capabilities regarding flexibility, strength, coordination, balance and their comprehension of modern dance in relation to music, space, time and energy. Through practice and application, students will understand the unique structure of their own bodies and expand their awareness of self and others. Theoretical aspects of dance related to historical and socio-cultural contexts will be explored. Learning about dance performance and history through the use of images, video, practice and discussions as well as reading and writing assignments will be part of the course. No previous dance experience is required. **Lec/Lab 4, Credits 3 (Fall, Spring)**
- PRFN-247** **Dance: Ballet**
This course is designed as an introduction to ballet observed through artistic principles, movement concepts and the exploration of technique. Students will discover new technical capabilities regarding flexibility, strength, coordination, balance and their comprehension of the ballet form in relation to music, space, time and energy. Through practice and application, students will understand the unique structure of their own bodies and expand their awareness of self and others. While the primary focus is on strengthening individual dance technique and knowledge of traditional and contemporary ballet movements, dynamic alignment, movement efficiency, connectivity, articulation, phrasing, and breath support, students can expect to develop an appreciation for aspects of the ballet aesthetic while considering theoretical aspects related to historical and socio-cultural contexts. Learning about dance performance and history through the use of images, video, practice and discussions as well as reading and writing assignments will be part of the course. No previous dance experience is required. **Lec/Lab 4, Credits 3 (Fall, Spring)**
- PRFN-250** **Choreography: Designing Movement**
This course focuses on the study and appreciation of dance and choreography through an exploration of theory, history, and social-cultural perspectives encompassing the elements related to designing movement. Students will explore various approaches of dance composition and the creative process from historical and cultural perspectives while examining the interactions of dance and movement found in society today. Attention will also be placed on the role of designing movement and space beyond the dance studio. Examples from live and recorded performances, as well as digitally produced creations such as animations in television, movies and video games, will be examined. **Lec/Lab 4, Credits 3 (Fall or Spring)**

PRFN-285**Undergraduate Research: Performing Arts**

This course is a faculty-directed student research project at the undergraduate level. The research will entail an in-depth study in the performing arts that could be considered of an original nature. Enrollment in this course requires permission from the Department Chair and completion of the NTID Undergraduate Research Contract. **Research, Credits 1 - 4 (Fall, Spring)**

PRFN-289**Special Topics: Performing Arts**

The description will be specified in each Special Topic Documentation Form. **Lecture, Credits 1 - 3 (Fall, Spring)**

Precision Manufacturing

NPMT-101**Blueprint Reading I**

Students develop the basic skills necessary to read and interpret fundamental engineering drawings of details, subassemblies, and assemblies. (NTID Supported Students.) **Lec/Lab 4, Credits 3 (Fall)**

NPMT-102**Blueprint Reading II**

In this second blueprint reading course, students continue to develop the skills necessary to read and interpret prints of engineering drawings of details and assemblies. More emphasis is placed on Metric drawings and Geometric Tolerances as applied to engineering drawings and part inspection. (Prerequisites: This class is restricted to NTID supported students who have completed NPMT-101 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NPMT-121**Precision Measurement I**

Students develop the skills necessary to measure to the highest tolerances commonly used in industry. They measure parts or groups of parts using industrial methods and equipment. Analysis of measurements and problem solving are stressed. (NTID Supported Students.) **Lec/Lab 2, Credits 3 (Spring)**

NPMT-131**Precision Manufacturing Technology I**

In this first course of a six course sequence, students develop basic skills for operating manual and computer controlled machine tools. Laboratory instruction simulates introductory level work in an industrial environment; student work is held to ANSI and ISO referenced standards for dimensional and geometric accuracy. Safe work habits are cultivated, and industrial safety rules are highly stressed during this course. (Co-requisites: NPMT-101 or equivalent course and NTID supported student.) **Lec/Lab 6, Credits 3 (Fall)**

NPMT-132**Precision Manufacturing Technology II**

In this second course in a six course sequence, students continue to develop basic skills for operating manual and computer controlled machine tools. Laboratory instruction simulates moderate level work in an industrial environment; student work is held to ANSI and ISO referenced standards for dimensional and geometric accuracy. Safe work habits are cultivated, and industrial safety rules are continually stressed during this course. (Prerequisites: This class is restricted to NTID supported students who have completed NPMT-101 and NPMT-131 or equivalent courses. Co-requisites: NPMT-121 and NMTH-206 or equivalent courses.) **Lec/Lab 6, Credits 3 (Spring)**

NPMT-199**Independent Study: Precision Manufacturing Technology**

Students develop in-depth knowledge and industrial skills in a topic of their choice under the supervision of PMT Faculty. (NTID Supported Students.) **Ind Study, Credits 1 - 4 (Fall, Spring)**

NPMT-201**Job Search for PMT**

Course goals are to prepare students to secure a cooperative or professional work experience in the student's major and to assist the student in acquiring the skills for accessing information, networking, developing resumes and letters, completing various employment-related forms, interviewing, and using various communication techniques in preparing students for the job search process. (NTID Supported Students.) **Lecture 2, Credits 2 (Fall)**

NPMT-207**Industrial Materials**

Introduction to the many materials used in industry and the reasons why the final cost of producing a part is influenced by material selection. Metals, plastics and ceramics are covered from the perspective of physical, mechanical and dimensional properties. (Prerequisites: This class is restricted to NTID supported students that have completed NPMT-131 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall)**

NPMT-214**CAD Applications**

Students develop engineering skills in engineering graphics and solid modeling. Students will primarily use computer-aided drafting (CAD) as a tool to generate 2D graphics and 3D solid models. The course is laboratory oriented and provides the student with basic skills in spatial visualization, freehand sketching, parametric solid modeling, and creation of engineering drawings which meet industrial drafting standards. (NTID Supported Students.) **Lec/Lab 6, Credits 3 (Fall, Spring)**

NPMT-222**Precision Measurement II**

Students enhance the measurement skills learned in Precision Measurement I. The emphasis of this course will be on using the principles of Geometric Dimensioning and Tolerancing to inspect machine parts. Emphasis will be placed on developing appropriate and repeatable inspection setups. Hands on experience with Optical Comparators and Coordinate Measuring Machines will be included. (Prerequisites: This class is restricted to NTID supported students that have completed NPMT-121 and NPMT-131 or equivalent courses.) **Lab 2, Credits 3 (Fall)**

NPMT-222**Precision Measurement II**

Students enhance the measurement skills learned in Precision Measurement I. The emphasis of this course will be on using the principles of Geometric Dimensioning and Tolerancing to inspect machine parts. Emphasis will be placed on developing appropriate and repeatable inspection setups. Hands on experience with Optical Comparators and Coordinate Measuring Machines will be included. (Prerequisites: This class is restricted to NTID supported students that have completed NPMT-121 and NPMT-131 or equivalent courses.) **Lecture 2, Credits 3 (Fall)**

NPMT-233**Precision Manufacturing Technology III**

In this third course of a six course sequence, students continue to develop basic skills for operating manual and computer controlled machine tools. Laboratory instruction simulates moderate level work in an industrial environment; student work is held to ANSI and ISO referenced standards for dimensional and geometric accuracy. Safe work habits are cultivated, and industrial safety rules are continually stressed during this course. (Prerequisites: This class is restricted to NTID supported students that have completed NPMT-132 or equivalent course. Co-requisites: NPMT-251 or equivalent course.) **Lec/Lab 6, Credits 3 (Fall)**

NPMT-234**Precision Manufacturing Technology IV**

In this fourth course of a six course sequence, students continue to develop basic skills for operating manual and computer controlled machine tools. Laboratory instruction simulates moderate level work in an industrial environment; student work is held to ANSI and ISO referenced standards for dimensional and geometric accuracy. Safe work habits are cultivated and industrial safety rules are continually stressed during this course. (Prerequisites: This class is restricted to NTID supported students that have completed NPMT-233 or equivalent course.) **Lec/Lab 6, Credits 3 (Spring)**

NPMT-235**Precision Manufacturing Technology V**

This fifth course of a six course sequence is the capstone for the students' program. After selecting a unique project, students control all aspects of its creation. Together with the laboratory section of this course, (co-requisite: NPMT-236 PMT V Lab), students discuss and perform all tasks associated with the manufacturing process. Tasks include innovative concepts and design, planning, procurement, scheduling, documenting, manufacturing, assembling, and presentation. Students must develop and deliver this project on-time and within budget. (Prerequisites: This class is restricted to NTID supported students that have completed NPMT-234 or equivalent course. Co-requisites: NPMT-236 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

NPMT-236**Precision Manufacturing Technology V Lab**

This sixth course of a six course sequence is the capstone for the students' program. After selecting a unique project, students control all aspects of its creation. Together with the classroom section of this course, (co-requisite: NPMT-235 PMT V), students perform all tasks associated with the manufacturing process. Taking designs and decisions made in the classroom, students use industrial machine tools to create and assemble the final project. Lab activities include machining and assembling. Students must deliver this project on-time and within budget. (Prerequisites: This class is restricted to NTID supported students that have completed NPMT-234 or equivalent course. Co-requisites: NPMT-235 or equivalent course.) **Lab 9, Credits 3 (Fall)**

NPMT-237**Precision Grinding**

Students develop basic skills for precision grinding techniques. Students learn about abrasives and grinding operations, with special focus on surface and center type cylindrical grinding. Laboratory exercises simulate moderately difficult precision work produced and inspected in an industrial environment. Students' work is held to ANSI and ISO referenced standards for dimensional and geometric accuracy. Safe work habits are cultivated and industrial safety rules are continually stressed during this course. (Prerequisites: This class is restricted to NTID supported students that have completed NPMT-233 or equivalent course.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

NPMT-241 Precision Optics Manufacturing I
In this course students learn and apply basic optical principles used in conventional manufacturing of precision optical flat elements. Procedures and techniques include blocking, vertical rotary grinding, rough bench grinding, double-sided lapping/grinding, polishing, deblocking and centering. Students practice and apply appropriate handling, cleaning and visual inspection techniques. A brief introduction to spherical grinding will be included. (Prerequisites: This class is restricted to NTID supported students that have completed NPMT-101 and NPMT-121 or equivalent courses.) **Lec/Lab 6, Credits 3 (Fall)**

NPMT-242 Precision Optics Manufacturing II
This course is the second in a sequence of courses in which students learn to apply basic principles of conventional and CNC manufacturing of optical elements. The emphasis in this course will be on the production of simple convex and concave spherical elements. Procedures and techniques include curve generating, blocking, rough and fine grinding, stick polishing, deblocking and centering. Students practice and apply appropriate handling and visual inspection techniques. (Prerequisites: This class is restricted to NTID supported students that have completed NPMT-241 or equivalent courses.) **Lab 6, Credits 3 (Spring)**

NPMT-251 Computer Numerical Control I
Students develop basic skills in programming CNC machine tools. Laboratory instruction simulates industrial environments in both the precision machining industry and the precision optics industry; student work is held to ISO referenced standards for dimensional and geometric accuracy. Safety in the operation of automated machines is an integral part of the course. (Prerequisites: This class is restricted to NTID supported students that have completed NPMT-132 or equivalent courses.) **Lec/Lab 6, Credits 3 (Fall)**

NPMT-252 Computer Numerical Control II
Students develop basic skills in programming CNC machine tools. Laboratory instruction simulates industrial environments in both the precision machining industry and the precision optics industry; student work is held to ISO referenced standards for dimensional and geometric accuracy. Safety in the operation of automated machines is an integral part of the course. (Prerequisites: This class is restricted to NTID supported students that have completed NPMT-251 or (0813-250 and 0813-252) or equivalent courses.) **Lec/Lab 6, Credits 3 (Spring)**

NPMT-253 Advanced CNC Concepts
This course is for students who want to learn more in-depth techniques related to CNC programming, process development and control, and product fixturing techniques using turning and milling centers. Students will develop more advanced knowledge of coding and editing parts using CAM/CAD software. A blend of practical theory and hands-on experience is required to perform complex setups in CNC machining centers. This includes CAD/CAM operations, program analysis, troubleshooting the solid model preparation, and the communication between CNC controls and CAD/CAM programs. (Prerequisites: This class is restricted to NTID supported students that have completed NPMT-252 and NPMT-254 or equivalent courses with a grade of B- or better.) **Lec/Lab 6, Credits 3 (Fall)**

NPMT-254 Introduction to Computer Aided Manufacturing
This course studies modern prototyping and manufacturing methods to create Computer Numerical Control (CNC) programs. Using the students' knowledge of Computer Aided Design (CAD) and the operations of Computer Numerical Control (CNC), they develop CNC programs, by means of Computer Assisted Manufacturing (CAM) systems. Using commercial CAM software, students will convert 2D drawings and 3D CAD models into CNC toolpaths. Students' output will be tested on two-axis and three-axis machining centers. (Prerequisites: This class is restricted to NTID supported students that have completed NPMT-214 and NPMT-251 or equivalent courses.) **Lec/Lab 6, Credits 3 (Spring)**

NPMT-289 Special Topics: Precision Manufacturing Technology
The description for each Special Topics request will be specified in each course proposal. (NTID Supported Students.) **Lecture, Credits 1 - 5 (Fall, Spring)**

NPMT-299 Co-op: Precision Manufacturing Technology
Students develop machining skills with on the job training at actual industrial facilities. This experience must contain a minimum of 350 hours of related work experience. One co-op experience is required for graduation. (Prerequisites: This class is restricted to NTID supported students with at least 2nd year standing.) **CO OP, Credits 0 (Summer)**

Science (NTID)

NSCI-153 Processes of Science: Environmental Studies
This course covers introductory science processes using the content of environmental studies as a vehicle to establish an appreciation of the scientific method, critical thinking, and problem solving. The basic processes of observing, collecting data, classifying, comparing, analyzing and forming hypotheses will be addressed using the concepts of environmental studies. (NTID Supported Students.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NSCI-154 Physics of Matter
This course focuses on introductory science processes using the content of physical properties of matter as a vehicle to establish an appreciation of the processes of science. The basic processes of observing, collecting data, classifying, comparing, analyzing, and forming hypotheses will be addressed using physics concepts including mass, density, displacement and buoyancy. (Prerequisites: This class is restricted to NTID supported students that have completed at least one (1) NMTH class - NMTH-180 or higher.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NSCI-155 Processes of Science: Biological Studies
This course covers introductory science processes using biology content as a vehicle to establish an appreciation of the scientific method, critical thinking and problem solving. The basic processes of observing, collecting data, classifying, comparing, analyzing, and forming hypotheses will be addressed using selected concepts in biology. (NTID Supported Students.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NSCI-156 Processes of Science: Forensics
This course covers introductory science processes using the content of forensics as a vehicle to establish an appreciation of the scientific method, critical thinking and problem solving. The basic processes of observing, collecting data, classifying, comparing, analyzing, and forming hypotheses will be addressed using the concepts of forensics. (NTID Supported Students.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NSCI-157 Processes of Science: Astronomy
This course covers introductory science processes using the content of astronomy as a vehicle to establish an introduction to the scientific method, critical thinking and problem solving. The basic processes of observing, collecting data, classifying, comparing, analyzing, and forming hypotheses will be addressed using the concepts of astronomy. Topics will include stellar motions in the sky, the solar system, and important historical deaf-scientist contributions to astronomy. Contemporary astronomy issues will be explored including the discovery of planets outside our solar system and the search for non-Earth life. (NTID Supported Students.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NSCI-161 Fundamentals of Biology I
This course provides students with fundamentals of cellular biology. Topics include chemical components of cells, cell structure and function, membrane transport, osmosis, cellular respiration and photosynthesis. Principles governing genetics, gene expression and reproduction are introduced. Laboratory methods used to make observations and collect data are practiced. Recording observations and analysis of data are emphasized in formal written laboratory reports. (NTID Supported Students.) **Lec/Lab 5, Credits 3 (Fall)**

NSCI-162 Fundamentals of Biology II
This course provides students with fundamentals of biological concepts and processes. Topics include plant and animal form and function, nutritional and excretory requirements, and homeostatic mechanisms and their regulation in organisms. Principles governing the concept of biological evolution and genomic evolution are introduced. Laboratory methods used to make observations and collect data are practiced. Recording observations and analysis of data are emphasized in formal written laboratory reports. Laboratory activities complement classroom activities. (Prerequisites: This class is restricted to NTID supported students that have completed NSCI-161 or equivalent course.) **Lec/Lab 5, Credits 3 (Spring)**

NSCI-199 Independent Study: Science
The description for each Independent Study request will be specified in each student/faculty proposal. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 4 (Fall, Spring)**

NSCI-200 Physics of Light
An introductory course in principles of physics related to light, reflection and refraction. These principles are applied to the behavior of spherical and plano mirrors, prisms and lenses. The usefulness and application of dioptric power, the lens maker's equation, image and object dimensions and focal length measurements are addressed. Also included is study of the electromagnetic spectrum. Emphasis is on geometrical (ray) optics. Includes a comprehensive laboratory experience that supplements and closely follows classroom instruction. (Prerequisites: This class is restricted to NTID supported students that have completed at least one (1) NMTH class - NMTH-180 or higher.) **Lec/Lab 4, Credits 3 (Spring)**

NSCI-201 Principles of Physics
Principles of Physics is designed to provide a broad background in general physics. Students are provided with hands-on laboratory experience in a supervised setting. Topics, which are presented in a lecture/lab format, include motion, Newton's Laws of Motion, forces, and analysis of vectors. (Prerequisites: This class is restricted to NTID supported students that have completed at least one (1) NMTH class - NMTH-180 or higher.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NSCI-270**Concepts of College Physics**

This is an introductory algebra-based physics course focusing on mechanics. It is designed to develop and enhance knowledge and skills necessary for success in college-level physics courses. Topics covered will include uncertainty, propagation of error, significant figures, unit conversion, translational motion in one and two dimensions, circular motion, kinematics and dynamics (both translational and angular), torque, and angular motion. This course includes in-class mechanics laboratories. (Prerequisites: This class is restricted to NTID supported students that have completed NMTH-220 and NMTH-275 or equivalent courses.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

NSCI-281**Human Genetics and Evolution**

This course introduces basic human genetics, basic human evolution and the relationship between 21st century discoveries in genetics and current human evolution dogma. The history of scientific discovery in both fields is paired with a study of current concepts in molecular biology and bridges between genetics and evolution are explored. This presentation/discussion/laboratory course includes topics in human reproductive history, cytology, embryology, molecular biology of the gene, the origin of life, human origins, heredity, genetic variations, population genetics, biotechnology, and old world and new world evolutionary theory. (Prerequisites: This class is restricted to NTID supported students who have an NTID Reading Test score greater than or equal to 125 or who have completed NENG-222 or NENG-231 or NENG-232 or NENG-241 or UWRT-100 or UWRT-150 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NSCI-282**Scientific Basis of Social Responsibility**

Interactive course designed to provide students with both tools and confidence to become more literate in the sciences. Students select and analyze contemporary social issues and/or problems that have a basis in science utilizing basic processes of scientific inquiry. Sample topics include the following: infectious disease processes; traditional vs. alternative medicine; biogenetics; life-style; euthanasia; environmental resources and management; world population trends; and, stem cell research. Following a definition of the issue/problem, students formulate research questions and share their collective findings. They then complete weekly topic summaries where positions are articulated. Topic-related laboratory exercises and community interactions provide hands-on lab opportunities to experience contemporary science and technology. (Prerequisites: This class is restricted to NTID supported students that have completed NENG-222 or NENG-231 or NENG-232 or NENG-241 or UWRT-100 or 0502-111 or UWRT-150 or equivalent courses.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NSCI-283**Developmental Human Anatomy and Physiology**

Introduces basic human development and maturation from a multi-disciplinary perspective. In this course, the fields of human anatomy and physiology are merged with developmental psychology for the purpose of examining the human life cycle from a holistic perspective. Changes that take place in the structure and function of the human body are studied over nine stages of the human life span. Concurrently, psychological and cognitive development are discussed, beginning with conception and ending with death processes. (Prerequisites: This class is restricted to NTID supported students that have completed NENG-222 or NENG-231 or NENG-232 or NENG-241 or UWRT-100 or 0502-111 or UWRT-150 or equivalent courses.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NSCI-284**Principles of Modern Astronomy**

This course will provide students with a general overview of the fundamental concepts and principles of modern astronomy. Topics covered will include properties of stars, their birth, life cycle, and death, galaxies, black holes and the evolution of the universe. Laboratory assignments that observe the night sky will occur at the RIT Observatory in addition to laboratories during class. (Prerequisites: This class is restricted to NTID supported students who have an NTID Reading Test score greater than or equal to 125 or who have completed NENG-222 or NENG-231 or NENG-232 or NENG-241 or UWRT-100 or UWRT-150 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NSCI-285**Undergraduate Research: Science**

This course is a faculty-directed student research project at the undergraduate level. The research will entail an in-depth study in science that could be considered of an original nature. Enrollment in this course requires permission from the Department Chair and completion of the NTID Undergraduate Research Contract. **Research, Credits 1 - 4 (Fall, Spring, Summer)**

NSCI-286**Perspective of Earth and Environmental Science**

This course will focus on the physical and interacting biological properties of the planet Earth and introduce students to the concept of environmental stewardship and social responsibility. Topics of study will include introductions to geology, astronomy, oceanography, biodiversity, and evolution. Students will learn about the delicate balance of weather and water and wild-life in the ecosystems in which humans have evolved and are now influencing in significant ways. Indoor and outdoor lab activities will introduce students to scientific data collection, analysis, and interpretation. Students will have the opportunity to become directly involved in solutions to our current environmental problems such as pollution, water quality degradation and recycling through various types of social activism. (Prerequisites: This class is restricted to NTID supported students who have an NTID Reading Test score greater than or equal to 125 or who have completed NENG-222 or NENG-231 or NENG-232 or NENG-241 or UWRT-100 or UWRT-150 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NSCI-287**Principles of Human Health and Disease**

In this course, students will study the normal structure and function of the eleven human organ systems. They will use this knowledge to explore the mechanisms of selected diseases relevant to today's society from each of the eleven systems. From there, students will investigate and evaluate current treatments for each disease. The organization of the human body at the cellular and tissue levels will also be discussed, leading into a survey of cancer. Laboratory exercises and case studies will allow students to apply the course content to a potential real-world scenario. (Prerequisites: This class is restricted to NTID supported students who have an NTID Reading Test score greater than or equal to 125 or who have completed NENG-222 or NENG-231 or NENG-241 or UWRT-100 or UWRT-150 or equivalent course.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

NSCI-289**Special Topics: Science**

The description for each Special Topics request will be specified in each proposal. (NTID Supported Students.) **Lec/Lab, Credits 1 - 4 (Fall, Spring)**

College of Science

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Course numbering: RIT courses are generally referred to by their alphanumeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100-299), upper division (300-599), or graduate level (600 and above).

Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.

Applied Cognitive Neuroscience

CGNS-222 Introduction to Cognitive Neuroscience
Cognition refers to mental action or processes of acquiring knowledge through the senses and through experience or thought. Neuroscience encompasses any or all of the sciences that deal with the structure and function of the nervous system and brain. This course provides the scientific foundation for the understanding of cognitive neuroscience, including neuroanatomy, neural signaling, motor control systems, the visual pathway, and research and experimental methods. Emphasis will be on Visual Neuroscience. (Prerequisites: (BIOG-101 and BIOG-102 or BIOL-101 and BIOL-102 or BIOL-121 and BIOL-122) and PSYC-101 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

CGNS-289 Neuroscience Special Topics
This course is a faculty-developed exploration of appropriate neuroscience topics that are not part existing curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. The level of study is appropriate for student in their first three years of study. **Lecture, Credits 1 - 4 (Fall, Spring, Summer)**

CGNS-295 Neuroscience Research
This course is a faculty-directed student project or research involving laboratory work, computer modeling, or theoretical calculations that could be considered of an original nature. The level of study is appropriate for students in their first three years of study. **Research, Credits 1 - 4 (Fall, Spring, Summer)**

CGNS-298 Neuroscience Independent Study
This course is a faculty-directed exploration of appropriate neuroscience topics that are not part of the formal curriculum. The level of study is appropriate for student in their first three years of study. **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**

CGNS-310

Experimental Lab Methods in Neuroscience

Scientists use a wide range of laboratory methods to elucidate the function of the brain and nervous circuits in enabling behavior. This course will provide an overview of these methods, in order to allow students to understand a wide range of scientific studies and to be able to select an appropriate method for a specific research topic. For understanding human cognitive functioning such methods include neuroimaging, psychophysiology, single-cell recordings, computational modeling, and cognitive psychology and behavioral methods that use measures such as response time and decision accuracy to test theories concerning the nature of mental processes and representations. The methods employed in animal behavior research use animal models, such as rodents, drosophila, nonhuman primates, as well as stereotaxic surgeries and electrode implants. Microscopy, manipulating and visualizing neural activity, as well as genetic, cellular and molecular techniques are among the arsenal of methods used in neuroscience to achieve understanding of neural system functioning at various levels. (Prerequisites: PSYC-222 & CGNS-222 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

CGNS-322

Animal Vision

This course explores the varied approaches to visually acquiring information employed by animals occupying aquatic and land-based environments, including lens-based, mirror, and compound eyes. Students will prepare oral presentations and written assignments based on the course readings and independent research. Students will develop the professional skills required for formal scientific presentations and writing. (Prerequisite: CGNS-222 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

CGNS-410

Imaging in Neuroscience

his course introduces students to the fundamental principles of neuroimaging methods that are used in basic and applied neuroscientific research. Topics include history of neuroimaging as well as an overview of major neuroimaging techniques, including magnetic resonance imaging (MRI), functional MRI, diffusion tensor imaging, positron emission tomography, functional near-infrared spectroscopy, electroencephalography, and magnetoencephalography. The course will also address structural and functional neuroanatomy, basic physical principles, experimental design, statistical analysis and specific methodological principles and limitations associated with each imaging technique, as well as neuroimaging applications in studying the normal and diseased brain. (Prerequisites: CGNS-310 and (ISCH-370 or STAT-257) and (PHYS-111 & PHYS-112) or (PHYS-211 & PHYS-212) or equivalent courses.) **Lecture 3, Credits 3 (Fall or Spring)**

CGNS-421

Neuroscience and Artificial Intelligence

Neuroscience has played a key role in the history of artificial intelligence (AI). The development of artificial neural networks was inspired by the knowledge gained from the study of brain functioning, with neuroscientists and psychologists, such as Donald Hebb, William McCulloch, and Geoff Hinton, contributing significantly to the establishment of the field. AI researchers aim to emulate human intelligence by building models and developing biologically-inspired architectures that can make decisions and solve problems in the same way that humans do. At the same time, artificial intelligence is increasingly used as a research tool in neuroscience to advance our understanding of how the human brain works and to accelerate neuroscience development. For example, by analyzing the massive amounts of experimental data on brain activity acquired using neuroimaging techniques, machine learning is used to uncover the patterns in brain activity and link them to specific cognitive and motor actions. This course reviews the fundamental ideas in computational neuroscience and connects the study of the brain to the concepts and research in artificial intelligence. The list of example topics includes neural coding, the biophysics of single neurons and neuron models, neural networks, biological and computational vision, adaptation and learning, machine learning, deep convolutional networks, memory, speech and language processing, and applications of computational neuroscience and artificial intelligence. (Prerequisites: PHYS-111 or PHYS-211 and (PHYS-111 & 112 or PHYS-211 & 212) and ISCH-110 or IMGS 180 and MATH-211 and (BIOL-124 & 126) and CGNS-222 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

CGNS-451

Cognitive Neuroscience Seminar A

Cognitive Neuroscience Seminar A is a weekly forum in which students will learn about and discuss historical and current topics in cognitive neuroscience. The course focuses on journal club discussions of papers selected by the students and faculty. It also includes oral presentations from students and faculty as well as visiting speakers from within and external to RIT. Students will prepare their own oral presentations and written assignments based on the course readings and independent research. Students will develop professional skills required for formal scientific presentations and writing. (Prerequisites: PSYC-222 & CGNS-222 or equivalent courses.) **Lecture 1, Credits 1 (Fall)**

CGNS-452 Cognitive Neuroscience Seminar B
Cognitive Neuroscience Seminar B is a weekly forum in which students will learn about and discuss historical and current topics in cognitive neuroscience. The course focuses on journal club discussions of papers selected by the students and faculty. It also includes oral presentations from students and faculty as well as visiting speakers from within and external to RIT. Students will prepare their own oral presentations and written assignments based on the course readings and independent research. Students will develop professional skills required for formal scientific presentations and writing. (Prerequisites: PSYC-222 & CGNS-222 or equivalent courses.) **Lecture 1, Credits 1 (Spring)**

CGNS-489 Neuroscience Advanced Special Topics
This course is a faculty-developed exploration of appropriate advanced neuroscience topics that are not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. The level of study is appropriate for student in their final two years of study. **Lecture, Credits 1 - 4 (Fall, Spring, Summer)**

CGNS-495 Neuroscience Advanced Research
This course is a faculty-directed, advanced, student project or research involving laboratory work, computer modeling, or theoretical calculations that could be considered of an original nature. The level of study is appropriate for students in their final two years of study. **Research, Credits 1 - 4 (Fall, Spring, Summer)**

CGNS-498 Neuroscience Advanced Independent Study
This course is a faculty-directed exploration of appropriate advanced neuroscience topics that are not part of the formal curriculum. The level of study is appropriate for student in their final two years of study. **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**

CGNS-501 Neuroscience Capstone I
Neuroscience has played a key role in the history of artificial intelligence (AI). The development of artificial neural networks was inspired by the knowledge gained from the study of brain functioning, with neuroscientists and psychologists, such as Donald Hebb, William McCulloch, and Geoff Hinton, contributing significantly to the establishment of the field. AI researchers aim to emulate human intelligence by building models and developing biologically-inspired architectures that can make decisions and solve problems in the same way that humans do. At the same time, artificial intelligence is increasingly used as a research tool in neuroscience to advance our understanding of how the human brain works and to accelerate neuroscience development. For example, by analyzing the massive amounts of experimental data on brain activity acquired using neuroimaging techniques, machine learning is used to uncover the patterns in brain activity and link them to specific cognitive and motor actions. This course reviews the fundamental ideas in computational neuroscience and connects the study of the brain to the concepts and research in artificial intelligence. The list of example topics includes neural coding, the biophysics of single neurons and neuron models, neural networks, biological and computational vision, adaptation and learning, machine learning, deep convolutional networks, memory, speech and language processing, and applications of computational neuroscience and artificial intelligence. **Research 3, Credits 1 (Fa/sp/su)**

CGNS-502 Neuroscience Capstone II
Students perform the independent research project defined in the proposal developed in COS-CGNS-501. The project is supervised by a faculty member in neuroscience program. The student submits a written paper and presents the results of the project to a public meeting. (Prerequisite: CGNS-501 or equivalent course.) **Research 3, Credits 3 (Fa/sp/su)**

Biological Sciences

BIOG-101 Explorations in Cellular Biology and Evolution
This course serves as an introduction to cellular, molecular, and evolutionary biology. Topics will include: a study of the basic principles of modern cellular biology, including cell structure and function; the chemical basis and functions of life, including enzyme systems and gene expression; and the origin of life and evolutionary patterns of organism development on Earth. (Prerequisites: Students may not take BIOG-101 if they have already taken BIOL-101. See the Biology department with any questions.) **Lecture 3, Credits 3 (Fall, Summer)**

BIOG-102 Explorations in Animal and Plant Anatomy and Physiology
This course serves as an introduction to animal and plant anatomy and physiology, in addition to the fundamentals of ecology. Topics will include: animal development; animal body systems; plant development; unique plant systems; Earth's terrestrial and aquatic environments; population and community ecology; animal behavior; and conservation biology. (Prerequisites: Students may not take BIOG-102 if they have already taken BIOL-102. See the Biology department with any questions.) **Lecture 3, Credits 3 (Spring, Summer)**

BIOG-103 Explorations in Cell Biology and Evolution Lab
Virtual laboratory work to complement the online course Explorations in Cell Biology & Evolution (BIOG101). The experiments are designed to illustrate concepts of basic cellular and molecular biology, microscopy, microevolution, and to develop basic scientific techniques, all in a virtual setting. Co-requisite: BIOG101: Explorations in Cell Biology & Evolution Lecture. (Co-requisites: BIOG-101 or equivalent course.) **Lab 3, Credits 1 (Fall, Summer)**

BIOG-104 Explorations in Animal and Plant Anatomy and Physiology Lab
Laboratory work to complement the online Explorations in Animal & Plant Anatomy & Physiology (BIOG102). The virtual experiments are designed to illustrate concepts of animal and plant anatomy and physiology, increase understanding of ecosystem interactive components, and improve ability to make, record and interpret observations. Co-requisite: BIOG102: Explorations in Animal & Plant Anatomy & Physiology. (Co-requisites: BIOG-102 or equivalent course.) **Lab 3, Credits 1 (Spring, Summer)**

BIOG-115 Garden Science
This course will introduce students to the science behind how plants grow, and how to apply this knowledge in a garden setting. The rationale is to encourage sustainability in garden food production, with an emphasis on organic methods. The course will be part lecture and part practical, with some sessions being conducted in the greenhouse or community garden. **Lab 3, Credits 3 (Spring)**

BIOG-115 Garden Science
This course will introduce students to the science behind how plants grow, and how to apply this knowledge in a garden setting. The rationale is to encourage sustainability in garden food production, with an emphasis on organic methods. The course will be part lecture and part practical, with some sessions being conducted in the greenhouse or community garden. **Lecture 2, Credits 3 (Spring)**

BIOG-140 Cell and Molecular Biology for Engineers I
This is the first course of a two-course sequence designed to introduce biomedical engineering students to the molecular and cellular basis of life with a particular emphasis on the integration of molecular systems that underscore human physiology. This course will start with the basic chemistry of biological macromolecules and then explore the cell starting from the nucleus and moving outward. Major topics will include: DNA replication; molecular basis of inheritance; the biology of RNA; gene expression; protein synthesis; the secretory pathways; and enzyme kinetics. **Lab 3, Credits 3 (Fall)**

BIOG-140 Cell and Molecular Biology for Engineers I
This is the first course of a two-course sequence designed to introduce biomedical engineering students to the molecular and cellular basis of life with a particular emphasis on the integration of molecular systems that underscore human physiology. This course will start with the basic chemistry of biological macromolecules and then explore the cell starting from the nucleus and moving outward. Major topics will include: DNA replication; molecular basis of inheritance; the biology of RNA; gene expression; protein synthesis; the secretory pathways; and enzyme kinetics. **Lecture 2, Credits 3 (Fall)**

BIOG-240 Cell and Molecular Biology for Engineers II
This is the second of a two-course sequence designed to introduce biomedical engineering students to the molecular and cellular basis of life with a particular emphasis on the integration of molecular systems in human physiology. This course will continue exploring sub-cellular systems by touring the function of each cellular organelle and describing the pathologic consequences that result from interruption of its normal function. Major topics will include: cellular energy production; the cytoskeleton; the lysosome; the plasma membrane; vesicle transport; cell-cell communication; signaling pathways; the cell cycle; and cell division. (Prerequisites: BIOG-140 or equivalent course.) **Lab 3, Credits 3 (Spring)**

BIOG-240 Cell and Molecular Biology for Engineers II
This is the second of a two-course sequence designed to introduce biomedical engineering students to the molecular and cellular basis of life with a particular emphasis on the integration of molecular systems in human physiology. This course will continue exploring sub-cellular systems by touring the function of each cellular organelle and describing the pathologic consequences that result from interruption of its normal function. Major topics will include: cellular energy production; the cytoskeleton; the lysosome; the plasma membrane; vesicle transport; cell-cell communication; signaling pathways; the cell cycle; and cell division. (Prerequisites: BIOG-140 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

- BIOG-340** **Biocompatibility and the Immune System**
This course combines a traditional basic immunology course with an introduction to principles of the human tissue response to biomaterial implantation. Information is presented in the context of common immune system pathologies to emphasize the relevance of immunology to biomedical engineering and human physiology. Major topics include the organization of the immune system and its myriad cells and cytokines, a review of bacterial and viral lifecycles, antibody/antigen specificity, inflammation, bacterial adhesion, biomaterial surface characterization and sterilization. Students explore biocompatibility testing, and learn the molecular basis for surface recognition and masking in implanted materials. The course emphasizes the interaction of various immune system components with engineered biological devices, implants, cells and tissues, and explores strategies and solutions for maximizing biocompatibility of engineered biomaterials with the immune system. (Prerequisites: BIOG-240 or equivalent course.) **Lecture 3, Credits 3 (Spring)**
- BIOL-101** **General Biology I**
This course serves as an introduction to cellular, molecular, and evolutionary biology. Topics will include: a study of the basic principles of modern cellular biology, including cell structure and function; the chemical basis and functions of life, including enzyme systems and gene expression; and the origin of life and evolutionary patterns of organism development on Earth. **Lecture 3, Credits 3 (Fall, Summer)**
- BIOL-102** **General Biology II**
This course serves as an introduction to animal and plant anatomy and physiology, in addition to the fundamentals of ecology. Topics will include: animal development; animal body systems; plant development; unique plant systems; Earth's terrestrial and aquatic environments; population and community ecology; animal behavior; and conservation biology. **Lecture 3, Credits 3 (Spring, Summer)**
- BIOL-103** **General Biology I Lab**
This course provides laboratory work to complement the lecture material of General Biology I. The experiments are designed to illustrate concepts of basic cellular and molecular biology, develop laboratory skills and techniques for microscopy, and improve ability to make, record and interpret observations. (Co-requisites: BIOL-101 or equivalent course.) **Lab 3, Credits 1 (Fall, Summer)**
- BIOL-104** **General Biology II Lab**
This course provides laboratory work to complement the material of General Biology II. The experiments are designed to illustrate concepts of animal and plant anatomy and physiology, develop laboratory skills and techniques for experimenting with live organisms, and improve ability to make, record, and interpret observations. (Co-requisites: BIOL-102 or equivalent course.) **Lab 3, Credits 1 (Spring, Summer)**
- BIOL-111** **Science in the Garden**
This course will introduce students to the science behind how plants grow, and how to apply this knowledge in a garden setting. The rationale is to encourage sustainability in garden food production, with an emphasis on organic methods. The course will be part lecture and part practical, with some sessions being conducted in the greenhouse or community garden. **Lab 3, Credits 4 (Fall)**
- BIOL-111** **Science in the Garden**
This course will introduce students to the science behind how plants grow, and how to apply this knowledge in a garden setting. The rationale is to encourage sustainability in garden food production, with an emphasis on organic methods. The course will be part lecture and part practical, with some sessions being conducted in the greenhouse or community garden. **Lecture 3, Credits 4 (Fall)**
- BIOL-121** **Introductory Biology I**
This course serves as an introduction to molecular biology, cellular biology, genetics, developmental biology, and evolutionary biology. Topics will include: a study of the basic principles of modern cellular biology, including cell structure and function; the chemical basis and functions of life, including enzyme systems and gene expression; and both the processes and patterns of the organismal development (ontogeny) and the evolution of life on Earth (phylogeny). Laboratory experiments are designed to illustrate concepts of basic cellular, molecular, developmental, and evolutionary biology, develop laboratory skills and techniques for microscopy and biotechnology, and improve ability to make, record and interpret observations. **Lab 3, Credits 4 (Fall, Spring)**
- BIOL-121** **Introductory Biology I**
This course serves as an introduction to molecular biology, cellular biology, genetics, developmental biology, and evolutionary biology. Topics will include: a study of the basic principles of modern cellular biology, including cell structure and function; the chemical basis and functions of life, including enzyme systems and gene expression; and both the processes and patterns of the organismal development (ontogeny) and the evolution of life on Earth (phylogeny). Laboratory experiments are designed to illustrate concepts of basic cellular, molecular, developmental, and evolutionary biology, develop laboratory skills and techniques for microscopy and biotechnology, and improve ability to make, record and interpret observations. **Lecture 3, Credits 4 (Fall, Spring)**
- BIOL-122** **Introductory Biology II**
This course serves as an introduction to the diversification of life, plant anatomy and physiology, animal anatomy and physiology, and ecology. Topics include a survey of the taxonomic diversity of the major groups of living organisms, the anatomical and physiological adaptations of both plants and animals, and the principles of the ecological relationships among organisms and environments. Laboratory exercises are designed to illustrate concepts of taxonomy, anatomical & physiological adaptation, and ecological relationships. Labs are also designed to help the development of laboratory skills and techniques for experiments with live organisms, and improve the ability to make, record and interpret observations. **Lab 3, Credits 4 (Fall, Spring)**
- BIOL-122** **Introductory Biology II**
This course serves as an introduction to the diversification of life, plant anatomy and physiology, animal anatomy and physiology, and ecology. Topics include a survey of the taxonomic diversity of the major groups of living organisms, the anatomical and physiological adaptations of both plants and animals, and the principles of the ecological relationships among organisms and environments. Laboratory exercises are designed to illustrate concepts of taxonomy, anatomical & physiological adaptation, and ecological relationships. Labs are also designed to help the development of laboratory skills and techniques for experiments with live organisms, and improve the ability to make, record and interpret observations. **Lecture 3, Credits 4 (Fall, Spring)**
- BIOL-123** **Introduction to Biology: Organisms and Ecosystems**
This course serves as an introduction to biology for majors, focusing on the organismal, population, and ecosystem levels. Major themes include: evolution, structure and function, information flow and storage, pathways and transformations of energy and matter, and systems. The course also focuses on developing core competencies, such as applying the process of science, using quantitative reasoning, communicating, and collaborating. **Lecture 3, Credits 3 (Fall)**
- BIOL-124** **Introduction to Biology: Molecules and Cells**
This course serves as an introduction to biology for majors, focusing on the molecular and cellular level. Major themes include: evolution, structure and function, information flow and storage, pathways and transformations of energy and matter, and systems. The course also focuses on developing core competencies, such as applying the process of science, using quantitative reasoning, communicating, and collaborating. **Lecture 3, Credits 3 (Spring)**
- BIOL-125** **Introduction to Biology Laboratory: Organisms and Ecosystems**
This course is an introduction to laboratory work in life sciences. The laboratory work is project-based, and may involve field work as well as laboratory experiments. The course is designed to show the huge scope of biology and will encompass how some molecular biology and bioinformatics techniques connect with organismal and ecological biology. (Co-requisites: BIOL-123 or equivalent course.) **Lab 3, Credits 1 (Fall)**
- BIOL-126** **Introduction to Biology Laboratory: Molecules and Cells**
This course is an introduction to laboratory work in life sciences. The laboratory work is project based, and the subject matter of the project(s) may vary. The course is designed to show the huge scope of biology and will encompass some molecular biology and bioinformatics techniques connect with organismal and ecological biology. (Co-requisites: BIOL-124 or equivalent course.) **Lab 3, Credits 1 (Spring)**
- BIOL-130** **Introduction to Bioinformatics**
This course will explore topics in the field of bioinformatics including tools and resources used by the discipline, including direct experience with the common user environment. **Lecture 3, Credits 3 (Fall)**
- BIOL-135** **Introduction to Bioinformatics Programming**
Computer programming in the life sciences is used for modeling and data analysis across all fields. In this course, students will learn the fundamentals of computer programming and apply it to solve real problems in the life sciences. Breaking down problems, common syntax, and thoughtful decisions on proper use of data structures will be emphasized. (UGRD-COS) **Lab 2, Credits 3 (Fall)**

BIOL-135**Introduction to Bioinformatics Programming**

Computer programming in the life sciences is used for modeling and data analysis across all fields. In this course, students will learn the fundamentals of computer programming and apply it to solve real problems in the life sciences. Breaking down problems, common syntax, and thoughtful decisions on proper use of data structures will be emphasized. (UGRD-COS) **Lecture 2, Credits 3 (Fall)**

BIOL-189**Introductory Special Topics**

This is an introductory course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (Permission of instructor) **Lec/Lab, Credits 1 - 4 (Fall, Spring, Summer)**

BIOL-201**Cellular and Molecular Biology**

This course will address the fundamental concepts of Cellular and Molecular Biology. Lectures, assignments, and laboratory projects will explore the structure and function of molecules, organelles, and cells and the biological processes they are involved in. Students in this course will gain an understanding of various molecular mechanisms, structure/function relationships, and cellular processes as they relate to cellular and molecular biology. Students in this course will practice and carry out common laboratory techniques used by Cellular and Molecular Biologists including, recombinant DNA technology, cell trafficking, and cloning techniques. (Prerequisites: (BIOL-101 and BIOL-103) or BIOL-121 and (BIOL-102 and BIOL-104) or BIOL-122 or equivalent courses.) **Lab 3, Credits 4 (Fall, Spring, Summer)**

BIOL-201**Cellular and Molecular Biology**

This course will address the fundamental concepts of Cellular and Molecular Biology. Lectures, assignments, and laboratory projects will explore the structure and function of molecules, organelles, and cells and the biological processes they are involved in. Students in this course will gain an understanding of various molecular mechanisms, structure/function relationships, and cellular processes as they relate to cellular and molecular biology. Students in this course will practice and carry out common laboratory techniques used by Cellular and Molecular Biologists including, recombinant DNA technology, cell trafficking, and cloning techniques. (Prerequisites: (BIOL-101 and BIOL-103) or BIOL-121 and (BIOL-102 and BIOL-104) or BIOL-122 or equivalent courses.) **Lecture 3, Credits 4 (Fall, Spring, Summer)**

BIOL-202**Molecular Biology**

This course will address the fundamental concepts of molecular biology. Class discussions, assignments, and laboratory projects will explore the structure and function of molecules and macromolecules, and processes important to storage and maintenance of genetic information and genetic information flow. Students in this course will explore molecular interactions that drive biological processes related to genetic information flow. Students in this course will gain an understanding of various molecular mechanisms, structure/function relationships, and processes as they relate to molecular biology. Students in this course will practice and carry out common laboratory techniques used by Molecular Biologists including, recombinant DNA technology and the detection and tracking of important macromolecules such as DNA, RNA and proteins. (Prerequisites: C- or better in (BIOL-101/102 and BIOL-103/104) or (BIOL-121/122) or equivalent. Students who have taken BIOL-201 cannot receive credit for BIOL-202. Co-requisites: (CHMG-141/145) or (CHEM-151/155) or CHMG-131 or equivalent course.) **Lab 3, Credits 4 (Fall, Spring)**

BIOL-202**Molecular Biology**

This course will address the fundamental concepts of molecular biology. Class discussions, assignments, and laboratory projects will explore the structure and function of molecules and macromolecules, and processes important to storage and maintenance of genetic information and genetic information flow. Students in this course will explore molecular interactions that drive biological processes related to genetic information flow. Students in this course will gain an understanding of various molecular mechanisms, structure/function relationships, and processes as they relate to molecular biology. Students in this course will practice and carry out common laboratory techniques used by Molecular Biologists including, recombinant DNA technology and the detection and tracking of important macromolecules such as DNA, RNA and proteins. (Prerequisites: C- or better in (BIOL-101/102 and BIOL-103/104) or (BIOL-121/122) or equivalent. Students who have taken BIOL-201 cannot receive credit for BIOL-202. Co-requisites: (CHMG-141/145) or (CHEM-151/155) or CHMG-131 or equivalent course.) **Lecture 3, Credits 4 (Fall, Spring)**

BIOL-204**Introduction to Microbiology**

This course is an introduction to microorganisms and their importance. Principles of structure and function, metabolic diversity, taxonomy, environmental microbiology, bioremediation, and infectious diseases of bacteria are discussed. Basic laboratory techniques covered include: microscopy; staining, culturing, isolation, and identification of bacteria; isolation and identification of normal flora; identification of unknown bacteria; antibiotic resistance; metabolic tests; clinical and commercial testing protocols; and detection and counting of bacteria in environmental samples (foods, water, soils). (Prerequisites: (BIOL-206 and BIOL-216) or BIOL-201 or BIOL-202 or BIOG-240 or equivalent courses.) **Lab 3, Credits 4 (Fall, Spring, Summer)**

BIOL-204**Introduction to Microbiology**

This course is an introduction to microorganisms and their importance. Principles of structure and function, metabolic diversity, taxonomy, environmental microbiology, bioremediation, and infectious diseases of bacteria are discussed. Basic laboratory techniques covered include: microscopy; staining, culturing, isolation, and identification of bacteria; isolation and identification of normal flora; identification of unknown bacteria; antibiotic resistance; metabolic tests; clinical and commercial testing protocols; and detection and counting of bacteria in environmental samples (foods, water, soils). (Prerequisites: (BIOL-206 and BIOL-216) or BIOL-201 or BIOL-202 or BIOG-240 or equivalent courses.) **Lecture 3, Credits 4 (Fall, Spring, Summer)**

BIOL-205**Animal Behavior**

This course is a comparative study of animal behavior from an evolutionary perspective. Lectures will examine the organization of behaviors including survival behaviors, social dynamics, and human behavior. Labs will demonstrate methods of gathering and interpreting behavioral data in the laboratory and in the field. (Prerequisites: (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (BIOL-123 and BIOL-124 and BIOL-125 and BIOL-126) or equivalent courses.) **Lab 3, Credits 4 (Fall)**

BIOL-205**Animal Behavior**

This course is a comparative study of animal behavior from an evolutionary perspective. Lectures will examine the organization of behaviors including survival behaviors, social dynamics, and human behavior. Labs will demonstrate methods of gathering and interpreting behavioral data in the laboratory and in the field. (Prerequisites: (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (BIOL-123 and BIOL-124 and BIOL-125 and BIOL-126) or equivalent courses.) **Lecture 3, Credits 4 (Fall)**

BIOL-206**Molecular Biology**

This course will address the fundamental concepts of Molecular Biology. Class discussions, assignments, and projects will explore the structure and function of biologically important molecules (DNA, RNA and proteins) in a variety of cellular and molecular processes. Students in this course will explore the molecular interactions that facilitate the storage, maintenance and repair of DNA and processes that drive the flow of genetic information and evolution. Students in this course will gain an understanding of various molecular mechanisms, structure/function relationships, and processes as they relate to molecular biology. The foundational molecular concepts in this course will be built upon in a variety of upper-level biology courses. (Prerequisite: (BIOL-101, BIOL-102, BIOL-103 & BIOL-104) or (BIOL-121 & BIOL-122) or (BIOL-123, BIOL-124, BIOL-125 & BIOL-126) or equivalent courses with a grade of C- or higher. Co-requisite: (CHMG-141 & CHMG-145) or (CHEM-151 & CHEM-155) or CHMG-131 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

BIOL-207**Galapagos: Ecology and Evolution**

A semester-long lecture course followed by a 14-day field trip to Ecuador and the Galapagos Islands. Students meet weekly on the RIT campus during spring semester to learn about the wildlife and geology of the islands, and about their influence on Darwin's theory of evolution. Galapagos is still an area of vibrant research and students will be introduced to current ecological, genetic, and geological studies. We will explore ongoing difficulties of balancing human needs with environmental conservation in the Galapagos. The field trip occurs shortly after the close of the semester in which the course is given. We will visit various sites in the islands, with excursions focusing on the unique wildlife and the geology. There are frequent snorkeling opportunities. The course provides outstanding opportunities for nature photography. Enrollment is limited to 15 students. A travel fee is required. (Permission of instructor) (This course requires permission of the Instructor to enroll.) **Lecture 1, Credits 1 - 3 (Fall)**

BIOL-211**Invertebrate Zoology**

A study of the biology of invertebrate animals with emphasis on phylogeny and functional morphology. (Prerequisites: (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (BIOL-123 and BIOL-124 and BIOL-125 and BIOL-126) or equivalent courses.) **Lab 3, Credits 4 (Spring)**

BIOL-211**Invertebrate Zoology**

A study of the biology of invertebrate animals with emphasis on phylogeny and functional morphology. (Prerequisites: (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (BIOL-123 and BIOL-124 and BIOL-125 and BIOL-126) or equivalent courses.) **Lecture 3, Credits 4 (Spring)**

BIOL-212**Vertebrate Zoology**

This course provides a synthesis of the ecological, behavioral, anatomical, and physiological characteristics of vertebrates in an evolutionary context. (Prerequisites: (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (BIOL-123 and BIOL-124 and BIOL-125 and BIOL-126) or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

- BIOL-216** **Molecular Biology Laboratory**
 This laboratory course will address the fundamental concepts of Molecular Biology. Students in this laboratory will complement their understanding of core concepts in Molecular Biology through the implementation and practice of laboratory techniques used by Molecular Biologists. Laboratory techniques and projects will focus on recombinant DNA technology and the detection and tracking of biomolecules such as DNA, RNA and proteins. (Prerequisite:(BIOL-101&BIOL-102&BIOL-103&BIOL-104)or(BIOL-121&BIOL-122) or(BIOL-123&BIOL-124&BIOL-125&BIOL-126) or equivalent courses w/ grade of C- or higher.Co-requisite:BIOL-206&((CHMG-141&CHMG-145)or(CHEM-151&CHEM-155)orCH-MG-131) or equivalent courses.) **Lab 3, Credits 1 (Fall, Spring)**
- BIOL-218** **Biology of Plants**
 This course will focus on aspects of plant anatomy and diversity and their impact on plant physiology. Adaptations to the environment and biotechnological approaches to unraveling the physiology of plants will be explored. A feature of this course will be discussion groups on plant topics from the popular scientific literature- e.g. Biofuels, Bioengineered Plants. The laboratory classes will follow the lectures closely, to give an opportunity to examine the structure and physiology of different plant genera. (Prerequisites: (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (BIOL-123 and BIOL-124 and BIOL-125 and BIOL-126) or equivalent courses.) **Lab 3, Credits 3 (Fall)**
- BIOL-218** **Biology of Plants**
 This course will focus on aspects of plant anatomy and diversity and their impact on plant physiology. Adaptations to the environment and biotechnological approaches to unraveling the physiology of plants will be explored. A feature of this course will be discussion groups on plant topics from the popular scientific literature- e.g. Biofuels, Bioengineered Plants. The laboratory classes will follow the lectures closely, to give an opportunity to examine the structure and physiology of different plant genera. (Prerequisites: (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (BIOL-123 and BIOL-124 and BIOL-125 and BIOL-126) or equivalent courses.) **Lecture 2, Credits 3 (Fall)**
- BIOL-220** **Biology of Fungi and Insects**
 This course provides a foundational understanding of fungal and insect biology. The first half of the semester will explore fugal cell biology, diversity, and reproduction, the role of fungi as pathogens and beneficial symbiotes, and fungal interactions with humans. The second half of the semester will explore insect morphology, physiology, reproduction, and the interaction of insects with other organisms (e.g., plants, fungi, humans, and other animals). (Prerequisites: BIOL-102 or BIOL-122 or BIOL-123 or equivalent course.) **Lecture 3, Credits 3 (Fall)**
- BIOL-230** **Bioinformatics Languages**
 This is an introductory course in languages commonly used in bioinformatics and their application to biological data. We will investigate the use of multiple languages for processing sequence and "-omics" data, building analysis pipelines, integrating languages, managing a variety of biological data types, and providing effective interfaces to existing tools for analysis of these data. The course is largely based around live-code demonstration, in-class assisted coding assignments, and a student-designed final class project. (Prerequisites: BIOL-135 or equivalent course.) **Lecture 2, Credits 3 (Spring)**
- BIOL-230** **Bioinformatics Languages**
 This is an introductory course in languages commonly used in bioinformatics and their application to biological data. We will investigate the use of multiple languages for processing sequence and "-omics" data, building analysis pipelines, integrating languages, managing a variety of biological data types, and providing effective interfaces to existing tools for analysis of these data. The course is largely based around live-code demonstration, in-class assisted coding assignments, and a student-designed final class project. (Prerequisites: BIOL-135 or equivalent course.) **Studio 2, Credits 3 (Spring)**
- BIOL-235** **Fundamentals of Bioinformatics Programming**
 Computer programming in the life sciences is used for modeling and data analysis across all fields. In this course, students will learn more advanced techniques to solve life sciences modeling problems efficiently using parallelization and distributed computing. Common methods and thoughtful decisions on proper use of tools will be emphasized. (Prerequisites: BIOL-230 or equivalent course and students in COS Majors.) **Lab 2, Credits 3 (Fall)**
- BIOL-235** **Fundamentals of Bioinformatics Programming**
 Computer programming in the life sciences is used for modeling and data analysis across all fields. In this course, students will learn more advanced techniques to solve life sciences modeling problems efficiently using parallelization and distributed computing. Common methods and thoughtful decisions on proper use of tools will be emphasized. (Prerequisites: BIOL-230 or equivalent course and students in COS Majors.) **Lecture 2, Credits 3 (Fall)**
- BIOL-240** **General Ecology**
 This course is an introduction to population, community and ecosystem ecology, stressing the dynamic interrelationships of plant and animal communities with their environments. The course includes such ecological concepts as energy flow and trophic levels in natural communities, population and community dynamics, biogeography and ecosystem ecology. (Prerequisites: (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (BIOL-123 and BIOL-124 and BIOL-125 and BIOL-126) or equivalent courses.) **Lab 3, Credits 4 (Fall)**
- BIOL-240** **General Ecology**
 This course is an introduction to population, community and ecosystem ecology, stressing the dynamic interrelationships of plant and animal communities with their environments. The course includes such ecological concepts as energy flow and trophic levels in natural communities, population and community dynamics, biogeography and ecosystem ecology. (Prerequisites: (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (BIOL-123 and BIOL-124 and BIOL-125 and BIOL-126) or equivalent courses.) **Lecture 3, Credits 4 (Fall)**
- BIOL-255** **Genetics and Society**
 Students will learn how genetic underpinnings of human health are discovered and how new discoveries impact societal values, prompting debates around ethical consideration of their use. (Prerequisites: (BIOL-101 and BIOL-102) or BIOL-121 or (BIOL-125 and BIOL-126) or equivalent courses.) **Lecture 3, Credits 3 (Spring)**
- BIOL-265** **Evolutionary Biology**
 This course investigates the historical framework of evolutionary biology and the meaning/nature of evidence pertinent to biological evolution. Topics will include: earth history, the evolution of proteins and the genetic code, molecular evolution, neutral theory vs. selection, genetic variation, natural selection, migration, mutation, genetic drift, fitness, population dynamics and genetics, speciation, systematics and classification systems, molecular phylogenetics, the evolution of eukaryotic organisms, behavioral evolution, historical biogeography, and human evolution and variation. (Prerequisites: (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (BIOL-123 and BIOL-124 and BIOL-125 and BIOL-126) or equivalent courses.) **Lecture 3, Credits 4 (Fall)**
- BIOL-265** **Evolutionary Biology**
 This course investigates the historical framework of evolutionary biology and the meaning/nature of evidence pertinent to biological evolution. Topics will include: earth history, the evolution of proteins and the genetic code, molecular evolution, neutral theory vs. selection, genetic variation, natural selection, migration, mutation, genetic drift, fitness, population dynamics and genetics, speciation, systematics and classification systems, molecular phylogenetics, the evolution of eukaryotic organisms, behavioral evolution, historical biogeography, and human evolution and variation. (Prerequisites: (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (BIOL-123 and BIOL-124 and BIOL-125 and BIOL-126) or equivalent courses.) **Recitation 2, Credits 4 (Fall)**
- BIOL-289** **Intermediate Special Topics**
 This is an intermediate course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lec/Lab, Credits 1 - 4 (Fall, Spring, Summer)**
- BIOL-290** **Vertebrate Evolution**
 This course is a study of the major changes in vertebrate functional morphology through time. The course will begin with fossilized fish records. The vertebrate evolution will then be traced to the era of mammals and end with humans. Additionally fossil evidence depicting major transitions between the vertebrate classes, modern taxonomy, including cladistic analysis, geologic time and stratigraphy, and plate tectonics will be presented. (Prerequisites: (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (BIOL-123 and BIOL-124 and BIOL-125 and BIOL-126) or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**
- BIOL-293** **Evolution and Creationism**
 This course explores the current controversy over the teaching of evolution in the public schools. Topics covered include pre-Darwinian views of natural history, Natural Theology and the argument from design, pre-Darwinian views of evolution, On The Origin of Species, and the public and scientific reception of natural selection. The major 20th and 21st century court cases, beginning with Scopes, and the Creationist responses, will be presented. The social and philosophical implications of evolution will be a major underlying theme. (Prerequisites: (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (BIOL-123 and BIOL-124 and BIOL-125 and BIOL-126) or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

BIOL-295**Biology Research**

This course is a faculty-directed student project or research involving laboratory work, computer modeling, or theoretical calculations that could be considered of an original nature. The level of study is appropriate for students in their first three years of study. (This course requires permission of the Instructor to enroll.) **Research, Credits 1 - 4 (Fall, Spring, Summer)**

BIOL-296**Ethical Issues in Biology and Medicine**

This course explores major ethical issues in medicine and biology via lecture, readings, films, and presentation and discussion of cases. Students report on current events in ethics as researched on the internet or other news media. The first portion of the course is in a lecture format. Students learn about various theories of ethical analysis that are in current use. Subsequent classes are devoted to particular ethical areas. Relevant cases are given to the students for presentation in both written and oral formats. Any additional background material that may be required to discuss the cases is presented by the instructor and the remainder of the period is discussion based on the philosophical foundation provided at the beginning of the course. (Prerequisites: (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (BIOL-123 and BIOL-124 and BIOL-125 and BIOL-126) or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

BIOL-298**Biology Independent Study**

This course is a faculty-directed tutorial of appropriate topics that are not part of the formal curriculum. The level of study is appropriate for student in their first three years of study. (This course requires permission of the Instructor to enroll.) **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**

BIOL-301**Undergraduate Teaching Experience**

This course allows students to assist in a class or laboratory for which they have previously earned credit. The student will assist the instructor in the operation of the course. Assistance by the student may include fielding questions, helping in workshops, and assisting in review sessions. In the case of labs, students may also be asked to help with supervising safety practices, waste manifestation, and instrumentation. (This course requires permission of the Instructor to enroll.) **Lecture, Credits 1 - 4 (Fall, Spring, Summer)**

BIOL-302**Cell Biology**

This course will address the fundamental concepts of cell biology. Class discussions, assignments, and laboratory projects will 1) Explore the structure-function relationships that drive cellular processes at the molecular, cellular and tissue level. 2) Investigate the mechanisms of cellular signaling and the transmission of genetic information. 3) Examine energy transformation strategies and the biochemical pathways used for synthesis and breakdown of ATP and other important biomolecules. 4) Investigate the organizational strategies used by cells to form functional tissue and organ systems. (Prerequisites: (BIOL-206 and BIOL-216) or BIOL-201 or BIOL-202 or BIOG-240 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

BIOL-303**Cell Physiology**

This course is a study of functional eukaryotic cellular physiology with an emphasis on the role of global gene expression in cellular function and disease. Nuclear and cytoplasmic regulation of macromolecular synthesis, regulation of cellular metabolism, control of cell growth, and the changes in cell physiology in disease are covered. This course also covers the technology used for studying changes in gene expression associated with cell differentiation and disease. The associated laboratory covers microarray techniques. This includes design and implementation of an experiment to acquire gene expression data, analyzing the acquired data using simple computer programs, such as MAGIC, and writing a research paper explaining findings. (Prerequisites: BIOL-201 or BIOL-302 or BIOG-240 or equivalent course.) **Lab 3, Credits 3 (Fall)**

BIOL-303**Cell Physiology**

This course is a study of functional eukaryotic cellular physiology with an emphasis on the role of global gene expression in cellular function and disease. Nuclear and cytoplasmic regulation of macromolecular synthesis, regulation of cellular metabolism, control of cell growth, and the changes in cell physiology in disease are covered. This course also covers the technology used for studying changes in gene expression associated with cell differentiation and disease. The associated laboratory covers microarray techniques. This includes design and implementation of an experiment to acquire gene expression data, analyzing the acquired data using simple computer programs, such as MAGIC, and writing a research paper explaining findings. (Prerequisites: BIOL-201 or BIOL-302 or BIOG-240 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

BIOL-304**Honors Science and the Law: Biological, Ethical Legal Perspectives**

This is an Honors course. This course will look at the use of biological evidence in the criminal justice system from the perspectives of a scientist and an experienced criminal defense attorney. Together they will describe the judicial process and their experiences with the system while addressing the strengths and weaknesses intrinsic to both the science and the law. Wherever possible they will employ case-based examples and delve into the ethical considerations intrinsic to the judicial process and to the application of scientific methods and technologies in court. Students will have opportunities to further explore course topics by exploring real cases and sharing their findings in class. A mock trial will be carried out in which students prepare defense and prosecution strategies and serve as attorneys and expert witnesses. Attorneys from the community will serve as judge and jurors. (Prerequisites: (BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (BIOL-123 and BIOL-124 and BIOL-125 and BIOL-126) or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

BIOL-305**Plants, Medicine and Technology**

Plants have played a significant role in the shaping of our world. This course will explore the utilization of plants for foods, fuels, materials, medicine, novel genetic information, and social aspects of different cultures. All cultures depend on about fifteen plant species, most of which have been changed by plant improvement methods to enhance human benefits. This course will explore these changes in important crops, plant constituents used in medicine, and the technology used to produce important plant-produced medicines. (Prerequisite: BIOL-201 or BIOL-202 or BIOL-206 or BIOG-240 or equivalent course.) **Lecture 4, Credits 4 (Spring)**

BIOL-306**Food Microbiology**

This course presents the microbiology of foods. Topics include microbial food spoilage, food-borne pathogens, food preservation techniques, and environmental parameters found in foods important in the survival of food spoilage microbes and foodborne pathogens. The lab will include exercises on isolating heterotrophs from all kinds of food, isolation of fungi from various foods, and the survival of various pathogens in food and beverages. (Prerequisites: BIOL-204 or equivalent course.) **Lab 3, Credits 4 (Spring)**

BIOL-306**Food Microbiology**

This course presents the microbiology of foods. Topics include microbial food spoilage, food-borne pathogens, food preservation techniques, and environmental parameters found in foods important in the survival of food spoilage microbes and foodborne pathogens. The lab will include exercises on isolating heterotrophs from all kinds of food, isolation of fungi from various foods, and the survival of various pathogens in food and beverages. (Prerequisites: BIOL-204 or equivalent course.) **Lecture 3, Credits 4 (Spring)**

BIOL-307**Microbiology of Wastewater**

This is an advanced course in the microbiology of wastewater treatment, solids treatment, and the generation and maintenance of drinking water. Topics include activated sludge processes, clarification processes, disinfection processes, trickling filters, rotating biological contactors, waste stabilization ponds, sludge microbiology, anaerobic digestion of biosolids, microbial aspects of drinking water and drinking water distribution systems, and public health aspects of wastewater and biosolids disposal on land and in marine systems. (Prerequisites: BIOL-204 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

BIOL-309**Comparative Vertebrate Anatomy**

This course is a comparative study of the evolution of organ systems among vertebrate animals with an emphasis on structural changes in homologous characters among representative vertebrate lineages. The course will explore the concepts of allometry, biomechanics, biophysics, ontogeny, phylogeny using examples from vertebrate integument, skeletal, muscular, respiratory, circulatory, digestive, urogenital, endocrine, nervous, and sensory systems. (Prerequisites: BIOL-265 or equivalent course.) **Lab 3, Credits 2 (Spring)**

BIOL-309**Comparative Vertebrate Anatomy**

This course is a comparative study of the evolution of organ systems among vertebrate animals with an emphasis on structural changes in homologous characters among representative vertebrate lineages. The course will explore the concepts of allometry, biomechanics, biophysics, ontogeny, phylogeny using examples from vertebrate integument, skeletal, muscular, respiratory, circulatory, digestive, urogenital, endocrine, nervous, and sensory systems. (Prerequisites: BIOL-265 or equivalent course.) **Lecture 1, Credits 2 (Spring)**

BIOL-310**Bioenergy: Microbial Production**

This course presents how microbial processes are used to produce various biofuels from renewable feedstocks. The topics presented include bioethanol production, biobutanol production, methane (biogas) production, biodiesel production, and the economics involved with the production of alternative fuels. (Prerequisites: BIOL-204 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

BIOL-313 **Comparative Animal Physiology**
 This course is a comparative study of fundamental physiological mechanisms. It covers a broad range of organisms studied from the standpoint of evolution of functional systems, the mechanisms and morphological variations that exist to deal with functional problems posed by the environment, and the special mechanisms used to cope with extreme environments. (Prerequisites: BIOL-240 or BIOL-265 or BIOL-202 or BIOL-206 or BIOG-240 or equivalent course.) **Lab 3, Credits 4 (Spring)**

BIOL-313 **Comparative Animal Physiology**
 This course is a comparative study of fundamental physiological mechanisms. It covers a broad range of organisms studied from the standpoint of evolution of functional systems, the mechanisms and morphological variations that exist to deal with functional problems posed by the environment, and the special mechanisms used to cope with extreme environments. (Prerequisites: BIOL-240 or BIOL-265 or BIOL-202 or BIOL-206 or BIOG-240 or equivalent course.) **Lecture 3, Credits 4 (Spring)**

BIOL-314 **Tissue Culture**
 This course will present the techniques and applications of culturing eukaryotic cells, tissues, and organs in vitro. Emphasis will be placed on mammalian systems. Lectures will cover the historical background of tissue culture, how to authenticate cell lines, basic cell culture techniques; as well as stem cells, tissue engineering, and the role of cell culture in regenerative medicine. In the laboratory, students will be introduced to growth curves, cloning techniques, primary cell culture, and making a cell line; as well as detecting mycoplasma and other cell culture contaminants. (Prerequisites: BIOL-201 or equivalent course.) **Lab 3, Credits 4 (Fall)**

BIOL-314 **Tissue Culture**
 This course will present the techniques and applications of culturing eukaryotic cells, tissues, and organs in vitro. Emphasis will be placed on mammalian systems. Lectures will cover the historical background of tissue culture, how to authenticate cell lines, basic cell culture techniques; as well as stem cells, tissue engineering, and the role of cell culture in regenerative medicine. In the laboratory, students will be introduced to growth curves, cloning techniques, primary cell culture, and making a cell line; as well as detecting mycoplasma and other cell culture contaminants. (Prerequisites: BIOL-201 or equivalent course.) **Lecture 3, Credits 4 (Fall)**

BIOL-315 **Tissue Culture Laboratory**
 This course will address the fundamental skills and concepts required to culture and maintain mammalian cells in culture. Laboratory discussions, assignments and projects will allow students to develop basic eukaryotic tissue culture techniques and explore tissue culture techniques in modern research and medical applications. (Prerequisites: (BIOL-206 and BIOL-216) or BIOL-201 or BIOL-202 or BIOG-240 or equivalent courses.Co-requisite: BIOL-302 or equivalent course.) **Lab 3, Credits 1 (Spring)**

BIOL-321 **Genetics**
 Introduction to the principles of inheritance; the study of genes and chromosomes at molecular, cellular, organismal, and population levels. (Prerequisites: (BIOL-206 and BIOL-216) or BIOL-201 or BIOL-202 or BIOG-240 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

BIOL-321 **Genetics**
 Introduction to the principles of inheritance; the study of genes and chromosomes at molecular, cellular, organismal, and population levels. (Prerequisites: (BIOL-206 and BIOL-216) or BIOL-201 or BIOL-202 or BIOG-240 or equivalent courses.) **Recitation 1, Credits 3 (Fall, Spring, Summer)**

BIOL-322 **Developmental Biology**
 This course is a study of the processes of growth, differentiation and development that lead to the mature form of an organism. The course will also address how developmental biology is integrated with other aspects of biology including disease, ecology, and evolution. (Prerequisites: (BIOL-206 and BIOL-216) or BIOL-201 or BIOL-202 or BIOG-240 or equivalent courses.) **Lab 3, Credits 4 (Fall)**

BIOL-322 **Developmental Biology**
 This course is a study of the processes of growth, differentiation and development that lead to the mature form of an organism. The course will also address how developmental biology is integrated with other aspects of biology including disease, ecology, and evolution. (Prerequisites: (BIOL-206 and BIOL-216) or BIOL-201 or BIOL-202 or BIOG-240 or equivalent courses.) **Lecture 3, Credits 4 (Fall)**

BIOL-325 **Bioinformatic Analysis of Macromolecules**
 This course addresses the fundamental concepts of bioinformatics, especially in regards to computational analysis of nucleic acids and proteins. The nature and extent of information available in bioinformatic databases will be presented. Discussion and utilization of computational programs for analysis of individual and multiple sequences for functional and evolutionary information will be discussed. The computational laboratory will highlight the multitude of web-based applications available for analysis of molecular sequences. (Prerequisites: BIOL-201 or equivalent course.) **Lab 3, Credits 3 (Fall)**

BIOL-325 **Bioinformatic Analysis of Macromolecules**
 This course addresses the fundamental concepts of bioinformatics, especially in regards to computational analysis of nucleic acids and proteins. The nature and extent of information available in bioinformatic databases will be presented. Discussion and utilization of computational programs for analysis of individual and multiple sequences for functional and evolutionary information will be discussed. The computational laboratory will highlight the multitude of web-based applications available for analysis of molecular sequences. (Prerequisites: BIOL-201 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

BIOL-327 **Fundamental Bioinformatics Analysis**
 This course addresses the fundamental concepts of bioinformatics, focusing on computational analysis of nucleic acids and proteins. Utilization of computational programs for analysis of individual and multiple sequences for functional and evolutionary information will be discussed. The computational laboratory will highlight the applications available for analysis of molecular sequences. (Prerequisite: BIOL-201 or BIOL-202 or BIOL-206 or BIOG-240 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

BIOL-327 **Fundamental Bioinformatics Analysis**
 This course addresses the fundamental concepts of bioinformatics, focusing on computational analysis of nucleic acids and proteins. Utilization of computational programs for analysis of individual and multiple sequences for functional and evolutionary information will be discussed. The computational laboratory will highlight the applications available for analysis of molecular sequences. (Prerequisite: BIOL-201 or BIOL-202 or BIOL-206 or BIOG-240 or equivalent course.) **Studio 2, Credits 3 (Fall)**

BIOL-330 **Bioinformatics**
 Bioinformatics introduces students to the analysis of biological sequences: DNA, mRNA, and protein. Emphasis is placed on classical bioinformatics analyses such as gene prediction, sequence alignment, and phylogenetics. The methods are applicable to both human and model organism studies in medical, biotechnological, and classical biology research. (Prerequisites: BIOL-201 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

BIOL-330 **Bioinformatics**
 Bioinformatics introduces students to the analysis of biological sequences: DNA, mRNA, and protein. Emphasis is placed on classical bioinformatics analyses such as gene prediction, sequence alignment, and phylogenetics. The methods are applicable to both human and model organism studies in medical, biotechnological, and classical biology research. (Prerequisites: BIOL-201 or equivalent course.) **Lab 3, Credits 3 (Fall)**

BIOL-335 **Phage Biology**
 Viruses that infect bacteria (phages) are ubiquitous wherever their hosts reside– whether in soil, a hot spring or our own digestive tract. Phages are also the most abundant and diverse biological entities, consequently phage research is relevant to health, industry, agriculture, ecology and evolution. Phage Biology is a research-intensive course designed to explore the fundamental properties of phages, how they interact with their bacterial hosts, the major techniques used to characterize them and their applications. Since phage particles are comprised of DNA and protein the techniques employed in this course have relevance to many other biological disciplines. This course will develop both laboratory and analytical skills as students will isolate and characterize mutant phages in a novel model system, becoming mutation sleuths to determine mutation locations and their effect. (Prerequisites: (BIOL-206 and BIOL-216) or BIOL-201 or BIOL-202 or BIOG-240 or equivalent courses.) **Lab 3, Credits 4 (Spring)**

BIOL-335 **Phage Biology**
 Viruses that infect bacteria (phages) are ubiquitous wherever their hosts reside– whether in soil, a hot spring or our own digestive tract. Phages are also the most abundant and diverse biological entities, consequently phage research is relevant to health, industry, agriculture, ecology and evolution. Phage Biology is a research-intensive course designed to explore the fundamental properties of phages, how they interact with their bacterial hosts, the major techniques used to characterize them and their applications. Since phage particles are comprised of DNA and protein the techniques employed in this course have relevance to many other biological disciplines. This course will develop both laboratory and analytical skills as students will isolate and characterize mutant phages in a novel mutation system, becoming mutation sleuths to determine mutation locations and their effect. (Prerequisites: (BIOL-206 and BIOL-216) or BIOL-201 or BIOL-202 or BIOG-240 or equivalent courses.) **Lecture 3, Credits 4 (Spring)**

BIOL-340**Genomics**

The overall goal of this course is to familiarize students with the theory and analysis of genomics data. Students will survey topics including the structure, organization, and expression of the genome in a diverse array of organisms ranging from microbes to humans. Students will also become familiar with the analysis of next generation 'omics-type data through a series of computational activities and problem sets. A hands-on laboratory component will guide students through a rigorous investigation of genomes. (Prerequisites: BIOL-321 or equivalent course.) **Lab 3, Credits 4 (Fall)**

BIOL-340**Genomics**

The overall goal of this course is to familiarize students with the theory and analysis of genomics data. Students will survey topics including the structure, organization, and expression of the genome in a diverse array of organisms ranging from microbes to humans. Students will also become familiar with the analysis of next generation 'omics-type data through a series of computational activities and problem sets. A hands-on laboratory component will guide students through a rigorous investigation of genomes. (Prerequisites: BIOL-321 or equivalent course.) **Lecture 3, Credits 4 (Fall)**

BIOL-341**Synthetic Biology**

The goal of the emerging field of synthetic biology is to design and construct novel biological systems that are useful. Synthetic biology examines the whole system of genes and gene products, their regulation, co-regulation and the interactions among their products, not individual genes. This course will cover organisms with known and characterized processes that are used to add or modify biological functions. Students will become proficient in the understanding of synthetic biology concepts and will master basic laboratory techniques utilized in synthetic biology. (Prerequisites: BIOL-201 or equivalent course.) **Lab 3, Credits 4 (Spring)**

BIOL-341**Synthetic Biology**

The goal of the emerging field of synthetic biology is to design and construct novel biological systems that are useful. Synthetic biology examines the whole system of genes and gene products, their regulation, co-regulation and the interactions among their products, not individual genes. This course will cover organisms with known and characterized processes that are used to add or modify biological functions. Students will become proficient in the understanding of synthetic biology concepts and will master basic laboratory techniques utilized in synthetic biology. (Prerequisites: BIOL-201 or equivalent course.) **Lecture 3, Credits 4 (Spring)**

BIOL-345**Molecular Ecology**

This course explores the biology of populations and communities of organisms using molecular data. As DNA, RNA and proteins are nearly universal between organisms, the principles taught in this course will have wide applications, both within ecology and throughout many sub-disciplines of biology. Furthermore, this course will prepare students to apply the techniques in numerous research fields. The primary literature and worldwide applications of the field of molecular ecology will be incorporated into the course. (Prerequisites: (BIOL-206 and BIOL-216) or BIOL-201 or BIOL-202 or BIOG-240 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

BIOL-365**Introduction to Population Genetics**

This course consists of a study of DNA, genes, inheritance, genetic variation, genetic architecture, and change within and among populations. Fundamental genetics topics include DNA, gene, and chromosomal structure and function along with, transmission genetics, Mendelian inheritance patterns, sex-linked inheritance, genetic linkage, and the Hardy-Weinberg Principle. Population based topics will include genetic variation, its importance, how it originates and is maintained as well as inbreeding, random mating, mutation, migration, selection, genetic drift, the effects of small population size, fitness, population subdivision, the shifting balance theory, inter-deme selection, kin selection, neutral theory, molecular evolution, molecular clocks, multi-gene families, gene conversion, artificial selection, the genetic basis of quantitative traits and the fundamental theorem of natural selection. (Prerequisites: BIOL-265 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

BIOL-370**Environmental Microbiology**

This course presents the microbiology of soils, freshwater, marine environments, and extreme environments. Topics include nutrient cycling in soils by microorganisms, the diversity of microorganisms in soils, the role of microorganisms in freshwater environments such as lakes, rivers, and wetlands and marine environments such as the open ocean, coastline environments, and salt marshes, and the diversity of microorganisms in extreme environments including highly acidic, highly alkaline, and highly saline environments. Laboratory experiments will explore the types of bacteria in different types of soils in Western New York, types of bacteria in different freshwater environments in Western NY, determining total and fecal coliform counts in freshwaters, determining the presence of antibiotic resistant coliforms in sediment samples, and examining the survival of various human pathogens in surface waters. (Prerequisites: BIOL-204 or equivalent course.) **Lab 3, Credits 4 (Fall)**

BIOL-370**Environmental Microbiology**

This course presents the microbiology of soils, freshwater, marine environments, and extreme environments. Topics include nutrient cycling in soils by microorganisms, the diversity of microorganisms in soils, the role of microorganisms in freshwater environments such as lakes, rivers, and wetlands and marine environments such as the open ocean, coastline environments, and salt marshes, and the diversity of microorganisms in extreme environments including highly acidic, highly alkaline, and highly saline environments. Laboratory experiments will explore the types of bacteria in different types of soils in Western New York, types of bacteria in different freshwater environments in Western NY, determining total and fecal coliform counts in freshwaters, determining the presence of antibiotic resistant coliforms in sediment samples, and examining the survival of various human pathogens in surface waters. (Prerequisites: BIOL-204 or equivalent course.) **Lecture 3, Credits 4 (Fall)**

BIOL-371**Freshwater Ecology**

This course will explore the ecology of freshwater ecosystems, including rivers, lakes, and wetlands; with an emphasis on ecosystems in Western New York. The chemical and physical environment of each system and the resulting biological communities will be explored. Threats to the ecosystem services supplied by freshwater resources will also be investigated. (Prerequisites: BIOL-240 or equivalent course.) **Lab 3, Credits 4 (Spring)**

BIOL-371**Freshwater Ecology**

This course will explore the ecology of freshwater ecosystems, including rivers, lakes, and wetlands; with an emphasis on ecosystems in Western New York. The chemical and physical environment of each system and the resulting biological communities will be explored. Threats to the ecosystem services supplied by freshwater resources will also be investigated. (Prerequisites: BIOL-240 or equivalent course.) **Lecture 3, Credits 4 (Spring)**

BIOL-372**Biology Without Walls**

Join a team of Life Science students to delve into a real-world field course. We will explore terrestrial, aquatic, invertebrate, vertebrate, plants and fungus together to understand the impacts of climate change and humans on ecosystems from the perspective of a glaciated, protected field site. Learn to work in the field, collect and analyze samples of all kinds, network with scientists, and build a skill set that will prepare you for your future. This course will have online and in person components in the semester, and we will travel to the field site at for an immersive field experience. Students must attend all sessions, including several days at the field site, to earn the credits for this course. Because this is a field-based course, travel to the selected field site is a requirement (e.g. a long-term field station in Northeast Pennsylvania). There will be an additional course fee assessed that will cover your expenses for travel, on site lodging, and food while away from RIT. Questions regarding travel or the fee should be directed to the course instructors. (Prerequisites: (BIOL-206 and BIOL-216) or BIOL-240 or BIOL-265 or equivalent courses.) **Activity, Credits 3 (Fall)**

BIOL-372**Biology Without Walls**

Join a team of Life Science students to delve into a real-world field course. We will explore terrestrial, aquatic, invertebrate, vertebrate, plants and fungus together to understand the impacts of climate change and humans on ecosystems from the perspective of a glaciated, protected field site. Learn to work in the field, collect and analyze samples of all kinds, network with scientists, and build a skill set that will prepare you for your future. This course will have online and in person components in the semester, and we will travel to the field site at for an immersive field experience. Students must attend all sessions, including several days at the field site, to earn the credits for this course. Because this is a field-based course, travel to the selected field site is a requirement (e.g. a long-term field station in Northeast Pennsylvania). There will be an additional course fee assessed that will cover your expenses for travel, on site lodging, and food while away from RIT. Questions regarding travel or the fee should be directed to the course instructors. (Prerequisites: (BIOL-206 and BIOL-216) or BIOL-240 or BIOL-265 or equivalent courses.) **Lab 3, Credits 3 (Fall)**

BIOL-375**Advanced Immunology**

This course is an in-depth treatment of the molecular and cellular events associated with innate and adaptive immune responses. The response of the host to the environment of microbes and pathogens will be emphasized. Recognition and response of the host to the infectious agents and the resolution of the disease state will be examined at the cellular and molecular levels. The immune response to tumors will be treated and medical advances in treating neoplastic disease using immunological therapy will be presented. The laboratories will focus on the cellular and molecular techniques employed in the modern immunology laboratory. A laboratory module employing hybridoma techniques will provide an intensive experience with monoclonal antibodies and their use in diagnostics and disease treatment. (Prerequisites: BIOL-201 or BIOL-302 or BIOG-240 or equivalent course.) **Lab 3, Credits 4 (Spring)**

BIOL-375 **Advanced Immunology**
 This course is an in-depth treatment of the molecular and cellular events associated with innate and adaptive immune responses. The response of the host to the environment of microbes and pathogens will be emphasized. Recognition and response of the host to the infectious agents and the resolution of the disease state will be examined at the cellular and molecular levels. The immune response to tumors will be treated and medical advances in treating neoplastic disease using immunological therapy will be presented. The laboratories will focus on the cellular and molecular techniques employed in the modern immunology laboratory. A laboratory module employing hybridoma techniques will provide an intensive experience with monoclonal antibodies and their use in diagnostics and disease treatment. (Prerequisites: BIOL-201 or BIOL-302 or BIOG-240 or equivalent course.) **Lecture 3, Credits 4 (Spring)**

BIOL-377 **Directed Research in Developmental Biology**
 In this lab-based course, students perform original research on the cellular and molecular mechanisms of development. Students use classical embryological, bioinformatics, molecular biology, and/or microscopy techniques, depending on the project. Students read and discuss primary scientific literature in a lab meeting setting, write a research paper and present their research findings in a talk or poster. Lab meets in two three-hour blocks; students are also expected to work independently for an additional three hours per week. (Prerequisites: BIOL-201 or BIOL-202 or BIOG-240 or equivalent course.) **Lab 6, Credits 3 (Spring)**

BIOL-380 **Bioremediation**
 This course is an introduction to bioremediation focusing on the interactions between engineers, chemists, hydrologists, and microbiologists to develop, design, and implement strategies to remediate contaminated soils or water. Topics include microorganisms involved in bioremediation, types of chemical pollutants, economics of remediation, environmental factors important in bioremediation, in situ processes, and ex situ processes. The laboratory project involves the isolation of hydrocarbon degrading bacteria from soils and sediments and further characterization of the hydrocarbon degrading isolates with respect to types of hydrocarbons degraded and rate of degradation. (Prerequisites: BIOL-204 or equivalent course.) **Lab 3, Credits 4 (Spring)**

BIOL-380 **Bioremediation**
 This course is an introduction to bioremediation focusing on the interactions between engineers, chemists, hydrologists, and microbiologists to develop, design, and implement strategies to remediate contaminated soils or water. Topics include microorganisms involved in bioremediation, types of chemical pollutants, economics of remediation, environmental factors important in bioremediation, in situ processes, and ex situ processes. The laboratory project involves the isolation of hydrocarbon degrading bacteria from soils and sediments and further characterization of the hydrocarbon degrading isolates with respect to types of hydrocarbons degraded and rate of degradation. (Prerequisites: BIOL-204 or equivalent course.) **Lecture 3, Credits 4 (Spring)**

BIOL-385 **Seneca Park Zoo Internship**
 This course will combine in-class lecture from specialists in the zoological field with volunteering in a zoo. This course will require the use of knowledge gained to design an exhibit for a selected species as a group. Topics covered will include the purpose of zoos, the history of the Seneca Park Zoo, wildlife medicine, population (conservation) genetics, biological exhibit design, zoo research, animal behavior, zoo management, zoo community education, and zoo ethics. There will be an opportunity to develop an understanding of the biological basis of the zoo's activities. This course will provide an intensive hands-on experience by assisting zoo staff in one department area for 8 hours, plus 2 hours of classroom work, per week over the semester. (Prerequisites: BIOL-240 or BIOL-265 or equivalent course.) **Lecture 2, Credits 4 (Fall)**

BIOL-389 **Special Topics**
 This is an advanced course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. The level of study is appropriate for students in their final two years of study. **Lec/Lab 3, Credits 1 - 3 (Fall, Spring, Summer)**

BIOL-399 **Biology Part-Time Cooperative Experience**
 This course is a part time cooperative education experience for undergraduate students majoring in biology, biotechnology and molecular bioscience, bioinformatics and computational biology. **CO OP, Credits 0 (Fall, Spring, Summer)**

BIOL-401 **Biological Separations: Principles and Practices**
 This is a laboratory-based course that teaches classic concepts and techniques to enable the use of these techniques to purify small molecules and macromolecules from whole organisms. Detection techniques will include the use of bacterial biosensors, coomassie-blue staining, silver staining, and immunoblot analysis. Separation techniques will include SDS Polyacrylamide gel electrophoresis (PAGE) analysis, thin layer chromatography, and paper electrophoresis. Purification techniques will include ammonium sulfate precipitation, affinity chromatography, and thin layer chromatography. (Prerequisites: BIOL-321 or equivalent course.) **Lab 3, Credits 4 (Spring)**

BIOL-401 **Biological Separations: Principles and Practices**
 This is a laboratory-based course that teaches classic concepts and techniques to enable the use of these techniques to purify small molecules and macromolecules from whole organisms. Detection techniques will include the use of bacterial biosensors, coomassie-blue staining, silver staining, and immunoblot analysis. Separation techniques will include SDS Polyacrylamide gel electrophoresis (PAGE) analysis, thin layer chromatography, and paper electrophoresis. Purification techniques will include ammonium sulfate precipitation, affinity chromatography, and thin layer chromatography. (Prerequisites: BIOL-321 or equivalent course.) **Lecture 3, Credits 4 (Spring)**

BIOL-403 **Fundamentals of Plant Biochemistry and Pathology**
 This course is primarily focused on biochemical and pathological aspects of a plant's life. This course provides an understanding of why protein catalysts are important in the field of plant biochemistry and plant pathology. More specifically, the role enzymes play in the basic cellular processes of plant growth and development is presented. Topics related to plant pathology are presented; such as plant disease epidemics, plant diagnosis, plant diseases caused by fungi, bacteria, nematodes, viruses, and plant-pathogen interaction, at the ecological, physiological and genetic level. (Prerequisites: BIOL-321 or equivalent course.) **Lab 3, Credits 4 (Fall, Spring)**

BIOL-403 **Fundamentals of Plant Biochemistry and Pathology**
 This course is primarily focused on biochemical and pathological aspects of a plant's life. This course provides an understanding of why protein catalysts are important in the field of plant biochemistry and plant pathology. More specifically, the role enzymes play in the basic cellular processes of plant growth and development is presented. Topics related to plant pathology are presented; such as plant disease epidemics, plant diagnosis, plant diseases caused by fungi, bacteria, nematodes, viruses, and plant-pathogen interaction, at the ecological, physiological and genetic level. (Prerequisites: BIOL-321 or equivalent course.) **Lecture 3, Credits 4 (Fall, Spring)**

BIOL-404 **Microbiology of Fermentation**
 Microbial fermentation is a hands-on course that will explore the use of fermented foods by early humans and the eventual control of the fermentative process by human culture. An understanding of the metabolism of fermenting microorganisms will be developed including an appreciation for metabolic engineering, starter cultures, and the genetic engineering of fermenting organisms. The course will also examine various fermentation processes including dairy products, cheese, meat, vegetables, bread, beer, wine, distilled spirits, vinegar, cocoa, and coffee. The course includes a laboratory component. (Prerequisites: BIOL-204 or equivalent course.) **Lab 3, Credits 3 (Fall)**

BIOL-404 **Microbiology of Fermentation**
 Microbial fermentation is a hands-on course that will explore the use of fermented foods by early humans and the eventual control of the fermentative process by human culture. An understanding of the metabolism of fermenting microorganisms will be developed including an appreciation for metabolic engineering, starter cultures, and the genetic engineering of fermenting organisms. The course will also examine various fermentation processes including dairy products, cheese, meat, vegetables, bread, beer, wine, distilled spirits, vinegar, cocoa, and coffee. The course includes a laboratory component. (Prerequisites: BIOL-204 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

BIOL-408 **Biology of Cancer**
 What are the differences between cancer and normal cells? What cellular pathways and molecular mechanisms do cancer cells exploit to gain proliferative advantage, circumvent programmed cell death pathways and evade the host surveillance system? In this course, students will answer these fundamental questions through activities, class discussion, readings and other assignments. Students will explore how the products of tumor suppressor genes, proto-oncogenes and oncogenes help or hinder the process of tumorigenesis in mammalian cells. Students will gain an understanding of the cellular and molecular mechanisms that govern cancer cell growth, communication and organization. Students will become familiar with landmark findings and current research in the area of Cancer Biology and will use experimental data to formulate scientific conclusions. Students will participate in several writing assignments to practice scientific writing and learn how to clearly communicate ideas related to Cancer Biology. (Prerequisites: BIOL-201 or BIOL-302 or BIOG-240 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

BIOL-412 **Human Genetics**
 The course provides an overview of concepts and applications in human genetics. Topics include classical and complex mechanisms of inheritance, the human genome, human origins & evolution, forensic applications, personalized medicine, and ethical issues. (Prerequisites: BIOL-321 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

BIOL-414**Animal Nutrition**

Students will explore applied topics in companion, agriculture, and wildlife animal nutrition. Emphasis will be placed on an overview of nutrient classes and methods of nutrient analysis, biological nutrient requirements, comparative digestive strategies, and specialized adaptations of animal taxa with different feeding strategies. Class discussions will focus on reading and interpretation of primary literature and investigating applied nutritional research questions. (Pre-requisite: BIOL-202 or BIOL-206 or BIOL-212 or BIOL-265 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

BIOL-415**Virology**

This course is an introduction to virology with specific emphasis on the molecular mechanisms of virus infection of eukaryotic cells and virus-cell interactions. Virus structure, genetics, the infectious cycle, replication strategies, pathogenesis, persistence, effects on host macromolecular synthesis, viral oncogenesis, viral vectors, emerging viral diseases, and strategies to protect against and combat viral infection will be discussed. (Prerequisites: BIOL-201 or BIOL-302 or BIOG-240 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

BIOL-416**Plant Biotechnology**

In this course aspects of plant biotechnology will be investigated. Areas of concentration will include: tissue culture, genetic transformation of plant cells, regeneration of transgenic plants, and the construction and characterization of transgenic plants for food production, experimental biology investigations, and novel product(development. The laboratory will provide experiences to complement(the lecture information in plant cell culture and experiences in the use of Agrobacterium as the gene shuttle to introduce novel genetic information into plants. (Prerequisites: BIOL-204 and BIOL-321 and BIOL-327 or equivalent courses.) **Lab 3, Credits 4 (Fall)**

BIOL-416**Plant Biotechnology**

In this course aspects of plant biotechnology will be investigated. Areas of concentration will include: tissue culture, genetic transformation of plant cells, regeneration of transgenic plants, and the construction and characterization of transgenic plants for food production, experimental biology investigations, and novel product(development. The laboratory will provide experiences to complement(the lecture information in plant cell culture and experiences in the use of Agrobacterium as the gene shuttle to introduce novel genetic information into plants. (Prerequisites: BIOL-204 and BIOL-321 and BIOL-327 or equivalent courses.) **Lecture 3, Credits 4 (Fall)**

BIOL-418**Plant Molecular Biology**

The course will introduce molecular biology concepts and encourage the application of these concepts to the particular plant gene being studied. This upper-level elective course has a strong laboratory element. Small groups will study different plant genes during the semester. The laboratory element will be a self-paced group project to amplify, clone, sequence, and examine the expression profiles of plant genes. Gene databases such as TAIR and NCBI, as well as sequence analysis software, will be used throughout the course. The groups will be guided to make week-by-week project plans, to troubleshoot problems, and record results in laboratory notebooks. In addition, weekly results and progress will be shared via an interactive wiki. (Prerequisites: (BIOL-206 and BIOL-216) or BIOL-201 or BIOL-202 or BIOG-240 or equivalent courses.) **Lab 3, Credits 4 (Spring)**

BIOL-418**Plant Molecular Biology**

The course will introduce molecular biology concepts and encourage the application of these concepts to the particular plant gene being studied. This upper-level elective course has a strong laboratory element. Small groups will study different plant genes during the semester. The laboratory element will be a self-paced group project to amplify, clone, sequence, and examine the expression profiles of plant genes. Gene databases such as TAIR and NCBI, as well as sequence analysis software, will be used throughout the course. The groups will be guided to make week-by-week project plans, to troubleshoot problems, and record results in laboratory notebooks. In addition, weekly results and progress will be shared via an interactive wiki. (Prerequisites: (BIOL-206 and BIOL-216) or BIOL-201 or BIOL-202 or BIOG-240 or equivalent courses.) **Lecture 3, Credits 4 (Spring)**

BIOL-420**Bacterial-Host Interactions: Microbiomes of the World**

This course focuses on the bacterial and host (human, insect, plant, animals and fungi) mechanisms used in interactions with hosts during both pathogenesis and symbiosis. We will explore molecular, microbiome and genomic levels, drawing on the disciplines of genomics, biochemistry, molecular biology and cell biology. Several of the agonistic and antagonistic interactions will illustrate broader principles and contribute to our fundamental understanding of biological processes. The results of these interactions have a strong impact on biological productivity, and so are also ever increasing important in human health. An emphasis will be on the roles of molecules and cell structures in determining the outcome of an interaction. Course is intended to allow students to develop knowledge of host-bacterial interactions at the molecular to organismal level, with an emphasis on several model symbiotic- and patho-systems. Knowledge about bacterial mechanisms use to associate with host organisms and the different strategies bacteria employ to gain entry, damage host tissue and obtain nutrients for growth will be explored. We will also illustrate several mutualistic relationships between eukaryotic hosts with partner symbiotic bacteria. Genomic approaches to describe microbiomes (microbial communities) on host organisms and in environments will also be explored. (Prerequisites: BIOL-204 or equivalent course.) **Lecture 3, Credits 3 (Spring, Summer)**

BIOL-425**Ethics in Bioinformatics**

This course focuses on individual and organizational responsibilities in bioinformatics research, product development, product commercialization and clinical and consumer genetic testing. (Prerequisites: BIOL-201 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

BIOL-427**Microbial and Viral Genetics**

The goal of this course is to gain an understanding of the genetic systems of prokaryotes and their viruses. There are two major foci: (1) the mechanisms bacteria and their viruses employ to preserve the integrity of their genomes and regulate gene expression, and (2) the mechanisms by which these entities acquire new genetic material. The relevance of these processes to evolution and the development of new traits that facilitate survival under new environmental conditions (e.g., antibiotic resistance) is highlighted, especially with regard to clinically, industrially and agriculturally important microbes. Molecular processes whose discovery led to the formation of important research and/or biotechnological tools will also be discussed. Students will participate in laboratory projects which highlight important mechanisms, such as transformation, transduction, lysogeny, conjugation and CRISPR-Cas acquired adaptive immunity. (Prerequisites: (BIOL-206 and BIOL-216) or BIOL-201 or BIOL-202 or BIOG-240 or equivalent courses.) **Lab 3, Credits 4 (Fall)**

BIOL-427**Microbial and Viral Genetics**

The goal of this course is to gain an understanding of the genetic systems of prokaryotes and their viruses. There are two major foci: (1) the mechanisms bacteria and their viruses employ to preserve the integrity of their genomes and regulate gene expression, and (2) the mechanisms by which these entities acquire new genetic material. The relevance of these processes to evolution and the development of new traits that facilitate survival under new environmental conditions (e.g., antibiotic resistance) is highlighted, especially with regard to clinically, industrially and agriculturally important microbes. Molecular processes whose discovery led to the formation of important research and/or biotechnological tools will also be discussed. Students will participate in laboratory projects which highlight important mechanisms, such as transformation, transduction, lysogeny, conjugation and CRISPR-Cas acquired adaptive immunity. (Prerequisites: (BIOL-206 and BIOL-216) or BIOL-201 or BIOL-202 or BIOG-240 or equivalent courses.) **Lecture 3, Credits 4 (Fall)**

BIOL-428**Eukaryotic Gene Regulation and Disease**

This course presents an overview of gene expression in eukaryotic systems, with an emphasis on how disease can result when gene regulation is disrupted. Points of control that are examined include: chromatin structure, transcription initiation, transcript processing, stability and modification, RNA transport, translation initiation, post-translational events, and protein stability. The mechanisms involved in regulating these control points are discussed by exploring specific well studied cases. The significance of these processes is highlighted by a discussion of several diseases that have been shown to be due to defects in gene regulation. (Prerequisites: BIOL-201 or BIOL-302 or BIOG-240 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

BIOL-441**Genetic Engineering and Synthetic Biology**

This is a laboratory-based course on the introduction to the theoretical basis, laboratory techniques, and applications of genetic manipulations. In the lecture sessions, students will explore the molecular methods, applications of recombinant DNA technology and the issues regarding their use on the effect of genetic engineering in medicine, agriculture, biology, forensics and other areas of technology. The laboratory session has major components: 1) techniques used in the generation of recombinant molecules, 2) use of DNA sequence information and bioinformatics in recombinant DNA applications, 3) use of inducible expression systems for production of biotechnological products, and 4) discussions of potential ethical concerns of genome modifications or enhancements. (Prerequisites: (BIOL-206 and BIOL-216) or BIOL-201 or BIOL-202 or BIOG-240 or equivalent courses.) **Lec/Lab 6, Credits 4 (Spring)**

College of Science

- BIOL-444** **Ornithology**
This course will cover the major principles in ornithology from evolutionary origins to the study of physiology, flight, behavior, life history traits and conservation. Exploration of current topics in avian biology and exploration of bird diversity will be key features of the lecture and lab. Labs will introduce current techniques in applied avian research and monitoring in both the field and lab. (Prerequisites: BIOL-212 or BIOL-240 or equivalent courses.) **Lab 2, Credits 3 (Fall)**
- BIOL-444** **Ornithology**
This course will cover the major principles in ornithology from evolutionary origins to the study of physiology, flight, behavior, life history traits and conservation. Exploration of current topics in avian biology and exploration of bird diversity will be key features of the lecture and lab. Labs will introduce current techniques in applied avian research and monitoring in both the field and lab. (Prerequisites: BIOL-212 or BIOL-240 or equivalent courses.) **Lecture 2, Credits 3 (Fall)**
- BIOL-450** **Genetic Engineering**
This course is a laboratory-intensive introduction to the theoretical basis, laboratory techniques, and applications of gene manipulation. (Prerequisites: BIOL-201 or equivalent course.) **Lab 8, Credits 5 (Spring)**
- BIOL-450** **Genetic Engineering**
This course is a laboratory-intensive introduction to the theoretical basis, laboratory techniques, and applications of gene manipulation. (Prerequisites: BIOL-201 or equivalent course.) **Lecture 2, Credits 5 (Spring)**
- BIOL-455** **Biogeography**
This course is the study of the distribution of biodiversity on the earth. Patterns of past and present animal and plant distributions are used to help understand the mechanisms of basic biological processes including speciation, dispersal, divergence, and extinction. This course will cover the character and history of the science of biogeography, as well as its basic principles and applications. We will also examine the assumptions, methods, and conclusions of historically significant biogeographic studies. (Prerequisites: BIOL-240 or BIOL-265 or equivalent course.) **Lecture 3, Credits 3 (Spring)**
- BIOL-460** **Infectious Disease: Impact on Society and Culture**
This course is an introduction to the probabilistic models and statistical techniques used in computational molecular biology. Examples include Markov models, such as the Jukes-Cantor and Kimura evolutionary models and hidden Markov models, and multivariate models use for discrimination and classification. (Prerequisites: CHMB-402 or BIOL-201 or BIOL-202 or BIOL-206 or BIOG-240. Students may not take and receive credit for BIOL-460 and CHMB-460. If you have earned credit for CHMB-460 or you are currently enrolled in CHMB-460 you may not enroll in BIOL-460.) **Lecture 3, Credits 3 (Spring)**
- BIOL-465** **Directed Research in Virology**
In this lab-based course, students perform project-based research on the cellular and molecular mechanisms of virology. Students use classical virological, tissue cell culture, and molecular biology techniques. Students read and discuss primary scientific literature in a lab meeting setting, write a research paper and present their research findings in a talk or poster. Class meets weekly for one-four hour block (1 hour of lecture and 3 hours of lab) and students are expected to work independently, with instructor oversight, outside of scheduled class time for an additional three hours per week. (Co-requisites: BIOL-415 or equivalent course.) **Lab 6, Credits 3 (Fall)**
- BIOL-465** **Directed Research in Virology**
In this lab-based course, students perform project-based research on the cellular and molecular mechanisms of virology. Students use classical virological, tissue cell culture, and molecular biology techniques. Students read and discuss primary scientific literature in a lab meeting setting, write a research paper and present their research findings in a talk or poster. Class meets weekly for one-four hour block (1 hour of lecture and 3 hours of lab) and students are expected to work independently, with instructor oversight, outside of scheduled class time for an additional three hours per week. (Co-requisites: BIOL-415 or equivalent course.) **Lecture 1, Credits 3 (Fall)**
- BIOL-470** **Statistical Analysis for Bioinformatics**
This course is an introduction to the probabilistic models and statistical techniques used in computational molecular biology. Examples include Markov models, such as the Jukes-Cantor and Kimura evolutionary models and hidden Markov models, and multivariate models use for discrimination and classification. (Prerequisites: (MATH-161 or MATH-173 or MATH-182) and (STAT-145 or MATH-251) or equivalent courses.) **Lecture 3, Credits 3 (Spring)**
- BIOL-489** **Special Topics**
This is an advanced course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. The level of study is appropriate for students in their final two years of study. (Prerequisites: BIOL-204 or equivalent course.) **Lec/Lab 3, Credits 1 - 3 (Fall, Spring, Summer)**
- BIOL-495** **Advanced Biology Research**
This course is a faculty-directed student project or research involving laboratory or field work, computer modeling, or theoretical calculations that could be considered of an original nature. The level of study is appropriate for students in their final two years of study. (This course requires permission of the Instructor to enroll.) **Research, Credits 1 - 4 (Fall, Spring, Summer)**
- BIOL-498** **Advanced Biology Independent Study**
This course is a faculty-directed tutorial of appropriate topics that are not part of the formal curriculum. The level of study is appropriate for student in their final two years of study. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**
- BIOL-499** **Biology Co-op**
Cooperative education experience for undergraduate biological sciences students. **CO OP, Credits 0 (Fall, Spring, Summer)**
- BIOL-500** **Experiential Learning Requirement in Life Science**
The experiential learning (EL) requirement may be fulfilled through a variety of methods including co-op, undergraduate research, summer research experiences, study abroad relevant to the major, designated EL courses, etc. All experiences must be approved by the GSOLS EL Committee. **Lecture, Credits 0 (Fall, Spring, Summer)**
- BIOL-530** **Bioinformatics Algorithms**
Bioinformatics Algorithms will focus on the types of analyses, tools, and databases that are available and commonly used in Bioinformatics. The labs will apply the lecture material in the analysis of real data through computer programming. (Prerequisites: BIOL-230 and BIOL-327 or equivalent courses.) **Lab 2, Credits 3 (Fall)**
- BIOL-530** **Bioinformatics Algorithms**
Bioinformatics Algorithms will focus on the types of analyses, tools, and databases that are available and commonly used in Bioinformatics. The labs will apply the lecture material in the analysis of real data through computer programming. (Prerequisites: BIOL-230 and BIOL-327 or equivalent courses.) **Lecture 2, Credits 3 (Fall)**
- BIOL-550** **High Throughput Sequencing Analysis**
Students will utilize commonly used bioinformatics tools to analyze a real High Throughput Sequencing data set starting with raw data, proceeding with quality control, either aligning to a reference genome or performing de novo assembly, assessing differential gene expression determination, and finally annotating their results. Weekly lab reports will be required, and a group manuscript is expected at the end of the semester. (Prerequisite: BIOL-201 or BIOL-202 or BIOL-206 or BIOG-240 or equivalent course.) **Lab 2, Credits 3 (Spring)**
- BIOL-550** **High Throughput Sequencing Analysis**
Students will utilize commonly used bioinformatics tools to analyze a real High Throughput Sequencing data set starting with raw data, proceeding with quality control, either aligning to a reference genome or performing de novo assembly, assessing differential gene expression determination, and finally annotating their results. Weekly lab reports will be required, and a group manuscript is expected at the end of the semester. (Prerequisite: BIOL-201 or BIOL-202 or BIOL-206 or BIOG-240 or equivalent course.) **Lecture 2, Credits 3 (Spring)**
- BIOL-573** **Marine Biology**
This course explores marine biology by focusing on the diversity of life and influence of oceanographic phenomena on the various ecosystems. Morphological and physiological adaptations along with environmental threats will also be investigated. (Prerequisites: BIOL-240 or equivalent course.) **Lecture 3, Credits 3 (Fall)**
- BIOL-575** **Conservation Biology**
This course focuses on the application of ecological principles to conservation issues. Human impact on species diversity is emphasized as it relates to agricultural, forest, coastal and wetland ecosystems. Case studies of management practices used to manage and restore disturbed ecosystems are included. (Prerequisites: BIOL-240 or equivalent course.) **Lecture 3, Credits 3 (Spring)**
- BIOL-589** **Special Topics**
This is an advanced course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lec/Lab, Credits 1 - 3 (Fall, Spring, Summer)**

BIOL-594**Molecular Modeling and Proteomics**

This course will explore two facets of protein molecules: separation and structure. The separation component will address common protein separation techniques such as 2D gel electrophoresis and chromatography. The structure component will follow the levels of protein structures, focusing on both experimental and computational methods to determine protein structures. Methods for determining primary structures such as Edman degradation method, Sanger method and mass spectrometry will be taught in lectures. Algorithms of predicting secondary structures will be introduced and implemented. Tertiary structure determination techniques such as NMR will be covered, with an emphasis on proton NMR, ¹³C NMR and multi-dimensional NMR. Homology modeling will be used to predict protein tertiary structures. (Prerequisite: BIOL-327 or equivalent course.) **Lab 2, Credits 3 (Spring)**

BIOL-594**Molecular Modeling and Proteomics**

This course will explore two facets of protein molecules: separation and structure. The separation component will address common protein separation techniques such as 2D gel electrophoresis and chromatography. The structure component will follow the levels of protein structures, focusing on both experimental and computational methods to determine protein structures. Methods for determining primary structures such as Edman degradation method, Sanger method and mass spectrometry will be taught in lectures. Algorithms of predicting secondary structures will be introduced and implemented. Tertiary structure determination techniques such as NMR will be covered, with an emphasis on proton NMR, ¹³C NMR and multi-dimensional NMR. Homology modeling will be used to predict protein tertiary structures. (Prerequisite: BIOL-327 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

BIOL-599**Research Based Writing**

This course is intended for students with significant research experience to work closely with their faculty mentors to prepare a manuscript for publication or write a proposal for external funding. Students will devote significant time to writing, revision and peer review. A submission-quality manuscript or proposal is expected at the end of the semester. (Prerequisites: BIOL-495 or BIOL-570 or equivalent course and permission of instructor.) **Research 3, Credits 3 (Fall, Spring, Summer)**

Chemistry**CHEM-130****Chemistry Connections**

This course introduces first-year chemistry and biochemistry majors to the topics of chemical safety, ethics, database searching, citation protocol, presentation development and execution as well as the career options in the field and opportunities at RIT and beyond. These topics will be covered in the context of developing a product that the student will accomplish during the lab component of the course. (This course is restricted to CHEM-BS or BIOCHEM-BS Major students.) **Seminar 1, Credits 1 (Fall)**

CHEM-151**General Chemistry**

An accelerated entry-level course designed for chemistry and biochemistry majors. Topics include measurement, atomic theory, chemical bonding and structure, stoichiometry, equilibrium and acid-base chemistry. (Prerequisites: This course is restricted to CHEM-BS or BIOCHEM-BS Major students. Co-requisite: CHEM-155 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

CHEM-155**Chemistry Workshop**

This course presents an introduction to working in a modern chemistry laboratory. Students will perform exercises that will aid in the understanding of general laboratory practices, atomic and molecular structure, and Lewis acid base theory. Students will also become familiar with keeping a scientific laboratory notebook and writing scientific abstracts. Students will also utilize modern chemical instrumentation to aid in the understanding of concepts. (Prerequisites: This course is restricted to CHEM-BS or BIOCHEM-BS Major students. Co-requisite: CHEM-151 or equivalent course.) **Lab 4, Credits 2 (Fall)**

CHEM-189**Introductory Special Topics**

This is an introductory course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lec/Lab, Credits 1 - 3**

CHEM-201**Clean Energy: Hydrogen Fuel Cells**

This course focuses on clean energy sources, theories of different fuel cell operations, hydrogen infrastructure, and the introduction of devices that employ hydrogen. Principles of energy utilization as they relate to the issues of global warming are presented. The fundamentals of electrochemistry, acid-base reactions, organic chemistry, polymers, thermodynamics, chemical kinetics, photochemistry, and plasma chemistry will be covered to develop a foundation for an understanding of renewable energy and hydrogen technology. Topics in the course include technical aspects of hydrogen utilization for power generation and transportation. Disposal schemes for by-products are also discussed. (Prerequisites: CHMG-121 or CHMG-131 or CHMG-141 or CHEM-151 or equivalent course.) **Lecture 3, Credits 3 (Spring, Summer)**

CHEM-201**Clean Energy: Hydrogen Fuel Cells Laboratory**

This laboratory course introduces the science of hydrogen technology and fuel cells. Students will gain hands-on experience in hydrogen systems instrumentation assembly, building control systems, and measuring the amount of hydrogen generated. Students will also become familiar with hydrogen sensing. (Corequisites: CHEM-201 or equivalent course.) **Lab 2, Credits 1 (Spring, Summer)**

CHEM-289**Intermediate Special Topics**

This is an intermediate course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lec/Lab, Credits 1 - 3 (Fall, Spring, Summer)**

CHEM-298**Chemistry Independent Study**

This course is a faculty-directed tutorial of appropriate topics that are not part of the formal curriculum. The level of study is appropriate for student in their first three years of study. (This course requires permission of the Instructor to enroll.) **Ind Study, Credits 1 - 3**

CHEM-301**Undergraduate Teaching Experience**

This course allows students to assist in a class or laboratory for which they have previously earned credit. The student will assist the instructor in the operation of the course. Assistance by the student may include fielding questions, helping in workshops, and assisting in review sessions. In the case of labs, students may also be asked to help with supervising safety practices, waste manifestation, and instrumentation. (Enrollment in this course requires permission from the department offering the course.) **Lab, Credits 1 - 3 (Fall, Spring, Summer)**

CHEM-389**Special Topics**

This is a comprehensive course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. **Lec/Lab 4, Credits 1 - 4 (Fall, Spring, Summer)**

CHEM-489**Advanced Special Topics**

This is an advanced course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. **Lec/Lab 4, Credits 1 - 3 (Fall, Spring, Summer)**

CHEM-493**Chemistry Research**

This course is a faculty-directed student project or research in chemistry that could be considered of an original nature. (Enrollment in this course requires permission from the department offering the course.) **Research, Credits 1 - 3 (Fall, Spring, Summer)**

CHEM-495**Advanced Chemistry Research**

This course is a faculty-directed student project or research involving laboratory work, computer modeling, or theoretical calculations that could be considered of an original nature. The level of study is appropriate for students in their final two years of study. (Enrollment in this course requires permission from the department offering the course.) **Research, Credits 1 - 3 (Fall, Spring, Summer)**

CHEM-498**Advanced Chemistry Independent Study**

This course is a faculty-directed tutorial of appropriate topics that are not part of the formal curriculum. The level of study is appropriate for student in their final two years of study. **Ind Study, Credits 1 - 3 (Fall, Spring, Summer)**

CHEM-499**Chemistry Co-op**

This course is a cooperative education experience for undergraduate chemistry students. **CO OP, Credits 0 (Fall, Spring, Summer)**

CHEM-500 Experiential Learning Requirement for Chemistry and Biochemistry Programs

The experiential learning (EL) requirement may be fulfilled through a variety of methods including co-op, undergraduate research, summer research experiences, study abroad relevant to the major, designated EL courses, etc. All experiences must be approved by the Department Head or Associate Department Head of SCMS. **Lecture, Credits 0 (Fall, Spring, Summer)**

CHEM-531**Climate Change: Science Technology and Policy**

This multidisciplinary course will provide students with diverse perspectives on global climate change issues, providing a survey of important aspects of the problem. Topics include atmospheric chemistry, climate modeling, ecological impacts and feedbacks, economics of climate change, international climate policies, and social and environmental justice. The course will include a variety of instructors and guest lecturers, providing an overview of the complex and inter-related nature of global climate change. (This class is restricted to undergraduate students with at least 3rd year standing.) **Lecture 3, Credits 3 (Spring)**

CHMA-161

This course will introduce students to quantitative methods. The course will cover gravimetric techniques, equilibria, statistical methods, and solution chemistry. In addition, equilibrium for polyprotic acids, electrochemistry and potentiometry will be discussed. (Prerequisites: CHEM-151 or CHMG-141 or equivalent course. Corequisites: CHMA-165 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

CHMA-165

This laboratory is designed for chemistry and biochemistry majors or those interested in pursuing a minor in chemistry. Experiments include statistics, calibration of equipment, spectroscopy, volumetric analyses, kinetics, Gran Plot, double endpoint titrations, potentiometric titration, photometric determination of copper, and water hardness. (Prerequisites: CHEM-155 or CHMG-145 or equivalent course. Corequisites: CHMA-161 or equivalent course.) **Lab 4, Credits 1 (Fall)**

CHMA-231**Chemical Instrumental Analysis for Engineers**

This course presents a preliminary treatment of instrumental theory and technique as well as hands on experience with modern chemical instrumentation. The course will cover the theory and implementation of spectroscopic, mass spectrometric, and chemical separations instrumentation and techniques. Instrumental techniques include: atomic and molecular emission and absorption and emission spectroscopies, atomic and molecular mass spectrometry, gas chromatography, and high performance liquid chromatography. Students will perform experiments utilizing modern chemical instrumentation and gain experience in analyzing data and presenting results experimental results. (Prerequisites: CHMA-161 or CHMG-142 or equivalent.) **Lab 3, Credits 3 (Spring)**

CHMA-231**Chemical Instrumental Analysis for Engineers**

This course presents a preliminary treatment of instrumental theory and technique as well as hands on experience with modern chemical instrumentation. The course will cover the theory and implementation of spectroscopic, mass spectrometric, and chemical separations instrumentation and techniques. Instrumental techniques include: atomic and molecular emission and absorption and emission spectroscopies, atomic and molecular mass spectrometry, gas chromatography, and high performance liquid chromatography. Students will perform experiments utilizing modern chemical instrumentation and gain experience in analyzing data and presenting results experimental results. (Prerequisites: CHMA-161 or CHMG-142 or equivalent.) **Lecture 2, Credits 3 (Spring)**

CHMA-261**Instrumental Analysis**

This course presents a preliminary treatment of instrumental theory and technique. The course will cover the theory and implementation of spectroscopic, mass spectrometric, and chemical separations instrumentation and techniques. Instrumental techniques include: atomic and molecular emission and absorption and emission spectroscopies, atomic and molecular mass spectrometry, gas chromatography, and high performance liquid chromatography. (Prerequisites: CHMA-161 or CHMG-142 or equivalent course. Corequisites: CHMA-265 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

CHMA-265**Instrumental Analysis Lab**

This course presents hands-on experience with modern chemical instrumentation including a number of spectroscopic techniques, mass spectrometry, gas chromatography, high performance liquid chromatography, and other. The course will cover the theory of operation of each instrument, their capabilities, and their limitations. Students will perform experiments utilizing modern chemical instrumentation and gain experience in analyzing data and presenting experimental results. (Prerequisites: CHMA-161 or CHMG-142 or equivalent course. Corequisites: CHMA-261 or equivalent course.) **Lab 3, Credits 1 (Fall)**

CHMB-189**Introductory Special Topics**

This is an introductory course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lec/Lab, Credits 1 - 3**

CHMB-240**Biochemistry for Health Sciences**

This course will focus on the application of biochemical knowledge to the field of medicine. Students will learn the basic functions of water, carbohydrates, lipids, proteins, and nucleic acids in humans, then explore implications of this knowledge in nutrition and metabolism and its relationship to health and disease. (Prerequisites: CHMG-142 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

CHMB-289**Intermediate Special Topics**

This is an intermediate course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lec/Lab, Credits 1 - 3**

Quantitative Analysis**CHMB-402**

This course introduces the structure and function of biological macromolecules and their metabolic pathways. The relationship between the three-dimensional structure of proteins and their function in enzymatic catalysis will be examined. Membrane structure and the physical laws that apply to metabolic processes will also be discussed. (Prerequisite: CHMO-231 or CHMO-331 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

Biochemistry I**CHMB-403**

This course will focus on advanced topics in biochemistry, using hands-on activities, in-class discussions, and review of relevant literature to explore the theory and applications behind current biochemical methods and concepts. (Prerequisites: CHMB-402 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

Biochemistry II**CHMB-405**

An introduction to the theory and practice of modern experimental biochemical laboratory techniques and concepts. The weekly two-hour lecture provides a theoretical framework for the course and includes a discussion of the properties of biomolecules and how those properties are exploited in the separation and characterization of the molecules. Practical laboratory techniques include the preparation of buffers, centrifugation, chromatography, electrophoretic methods, and UV-visible spectrophotometry as applied to the isolation and characterization of proteins and nucleic acids. The manipulation of genetic material in *E. coli* will also be executed. This course will be offered in a writing intensive format where the students will write and submit the different sections found in scientific papers (abstract, introduction, materials and methods, results, discussion, conclusions, references, figures, tables) in an iterative fashion that will include regular feedback from the instructor. (Prerequisites: CHMB-402 or equivalent course.) **Lec/Lab 5, Credits 3 (Fall, Spring)**

Biochemistry Lab**CHMB-460**

This course investigates the mechanisms of pathogenesis of bacterial, viral, and other microbial infectious agents. This course also covers the historical, social, and cultural impact that these infectious diseases have had on society. Topics may include: antibiotics and antibiotic resistance, vaccines, gut microflora and health, foodborne illnesses, bioterrorism, HIV, tuberculosis, malaria, and staph infections. (Prerequisites: CHMB-402 or BIOL-201. Students may not take and receive credit for BIOL-460 and CHMB-460. If you have earned credit for BIOL-460 or you are currently enrolled in BIOL-460 you will not be permitted to enroll in CHMB-460.) **Lecture 3, Credits 3 (Spring)**

Infectious Diseases: Impact Society and Culture**CHMB-489**

This is an advanced course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lec/Lab, Credits 1 - 3**

Advanced Special Topics**CHMB-493**

This course is a faculty-directed student project or research in biochemistry that could be considered of an original nature. (Enrollment in this course requires permission from the department offering the course.) **Research, Credits 1 - 3 (Fall, Spring, Summer)**

Biochemistry Research**CHMB-495**

This course is a faculty-directed student project or research involving laboratory work, computer modeling, or theoretical calculations that could be considered of an original nature. The level of study is appropriate for students in their final two years of study. (Enrollment in this course requires permission from the department offering the course.) **Research, Credits 1 - 3 (Fall, Spring, Summer)**

Advanced Biochemistry Research**CHMB-498**

This course is a faculty-directed tutorial of appropriate topics that are not part of the formal curriculum. The level of study is appropriate for student in their final two years of study. (This course requires permission of the Instructor to enroll.) **Lecture, Credits 1 - 3**

Advanced Biochemistry Independent Study**CHMB-499**

This course is a cooperative education experience for undergraduate biochemistry students. **CO OP, Credits 0 (Fall, Spring, Summer)**

Biochemistry Co-op**CHMG-111**

This course is a foundations course in chemistry; no chemistry background is required. Fundamentals include: dimensional analysis; matter and energy; atomic theory; molecular structure; chemical bonding; chemical reactions; solution chemistry, states of matter, reaction rates, equilibrium, and acid/base chemistry. The lecture is complemented by hands-on laboratory exercises with workshop-style problem sessions in which the student will gain experience with basic laboratory techniques: gravimetric, volumetric, thermal and titration analyses, and use these techniques to analyze chemical reactions. The course material will emphasize the relationship between chemistry and modern sociological, nutritional and environmental issues. **Lab 3, Credits 4 (Fall)**

General-Organic-Biochemistry I

CHMG-111**General-Organic-Biochemistry I**

This course is a foundations course in chemistry; no chemistry background is required. Fundamentals include: dimensional analysis; matter and energy; atomic theory; molecular structure; chemical bonding; chemical reactions; solution chemistry, states of matter, reaction rates, equilibrium, and acid/base chemistry. The lecture is complemented by hands-on laboratory exercises with workshop-style problem sessions in which the student will gain experience with basic laboratory techniques: gravimetric, volumetric, thermal and titration analyses, and use these techniques to analyze chemical reactions. The course material will emphasize the relationship between chemistry and modern sociological, nutritional and environmental issues. **Lecture 3, Credits 4 (Fall)**

CHMG-112**General-Organic-Biochemistry II**

The course covers the foundations of organic chemistry and biochemistry. Fundamentals include organic nomenclature and structure, functional groups including alcohols, carbonyls, amines, and organic reactions. The course then applies functional group chemistry to the study of carbohydrates, lipids, nucleic acids and proteins. The lecture is complemented by laboratory exercises in which the student will gain experienced with organic laboratory techniques. Methods of separating, purifying, and characterizing organic compounds are covered. The lecture/lab course will familiarize students with the relationship between organic chemistry, biochemistry, and modern pharmaceutical, nutritional and environmental issues. (Prerequisites: CHMG-111 or equivalent course.) **Lab 3, Credits 4 (Spring)**

CHMG-112**General-Organic-Biochemistry II**

The course covers the foundations of organic chemistry and biochemistry. Fundamentals include organic nomenclature and structure, functional groups including alcohols, carbonyls, amines, and organic reactions. The course then applies functional group chemistry to the study of carbohydrates, lipids, nucleic acids and proteins. The lecture is complemented by laboratory exercises in which the student will gain experienced with organic laboratory techniques. Methods of separating, purifying, and characterizing organic compounds are covered. The lecture/lab course will familiarize students with the relationship between organic chemistry, biochemistry, and modern pharmaceutical, nutritional and environmental issues. (Prerequisites: CHMG-111 or equivalent course.) **Lecture 3, Credits 4 (Spring)**

CHMG-122**Chemistry of Water and Wastewater**

This course addresses the chemistry of water and its analysis, which includes: pH; alkalinity; acidity; fluoride; chloride; phosphate; biochemical oxygen demand; chemical oxygen demand, nitrogen; metals; radioactivity; residual chloride; chlorine demand; measurement of solid matter in industrial wastes and sludges; and trace contaminants. (Prerequisites: CHMG-121 or CHMG-131 or CHMG-141 or equivalent courses.) **Lab 2, Credits 3 (Fall)**

CHMG-122**Chemistry of Water and Wastewater**

This course addresses the chemistry of water and its analysis, which includes: pH; alkalinity; acidity; fluoride; chloride; phosphate; biochemical oxygen demand; chemical oxygen demand, nitrogen; metals; radioactivity; residual chloride; chlorine demand; measurement of solid matter in industrial wastes and sludges; and trace contaminants. (Prerequisites: CHMG-121 or CHMG-131 or CHMG-141 or equivalent courses.) **Recitation 1, Credits 3 (Fall)**

CHMG-122**Chemistry of Water and Wastewater**

This course addresses the chemistry of water and its analysis, which includes: pH; alkalinity; acidity; fluoride; chloride; phosphate; biochemical oxygen demand; chemical oxygen demand, nitrogen; metals; radioactivity; residual chloride; chlorine demand; measurement of solid matter in industrial wastes and sludges; and trace contaminants. (Prerequisites: CHMG-121 or CHMG-131 or CHMG-141 or equivalent courses.) **Lecture 2, Credits 3 (Fall)**

CHMG-123**Chemistry of Materials**

The course will address three fundamental concepts of general chemistry by covering three aspects of all chemical reactions: kinetics, equilibrium and thermodynamics. Acid/base and oxidation/reductions will be discussed. The chemistry of metals, ceramics and synthetic polymers will be covered, including electrochemistry and a brief overview of organic chemistry. (Prerequisites: CHMG-121 or CHMG-131 or CHMG-141 or equivalent courses.) **Lab 3, Credits 3 (Fall, Spring)**

CHMG-123**Chemistry of Materials**

The course will address three fundamental concepts of general chemistry by covering three aspects of all chemical reactions: kinetics, equilibrium and thermodynamics. Acid/base and oxidation/reductions will be discussed. The chemistry of metals, ceramics and synthetic polymers will be covered, including electrochemistry and a brief overview of organic chemistry. (Prerequisites: CHMG-121 or CHMG-131 or CHMG-141 or equivalent courses.) **Lecture 2, Credits 3 (Fall, Spring)**

CHMG-131**General Chemistry for Engineers**

This rigorous course is primarily for, but not limited to, engineering students. Topics include an introduction to some basic concepts in chemistry, stoichiometry, First Law of Thermodynamics, thermochemistry, electronic theory of composition and structure, and chemical bonding. The lecture is supported by workshop-style problem sessions. Offered in traditional and online format. **Lecture 3, Credits 3 (Fall, Spring)**

CHMG-141**General and Analytical Chemistry I**

This is a general chemistry course for students in the life and physical sciences. College chemistry is presented as a science based on empirical evidence that is placed into the context of conceptual, visual, and mathematical models. Students will learn the concepts, symbolism, and fundamental tools of chemistry necessary to carry on a discourse in the language of chemistry. Emphasis will be placed on the relationship between atomic structure, chemical bonds, and the transformation of these bonds through chemical reactions. The fundamentals of organic chemistry are introduced throughout the course to emphasize the connection between chemistry and the other sciences. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

CHMG-142**General and Analytical Chemistry II**

The course covers the thermodynamics and kinetics of chemical reactions. The relationship between energy and entropy change as the driving force of chemical processes is emphasized through the study of aqueous solutions. Specifically, the course takes a quantitative look at: 1) solubility equilibrium, 2) acid-base equilibrium, 3) oxidation-reduction reactions and 4) chemical kinetics. (Prerequisites: CHMG-141 or CHMG-131 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

CHMG-145**General and Analytical Chemistry I Lab**

The course combines hands-on laboratory exercises with workshop-style problem sessions to complement the CHMG-141 lecture material. The course emphasizes laboratory techniques and data analysis skills. Topics include: gravimetric, volumetric, thermal, titration and spectrophotometric analyses, and the use of these techniques to analyze chemical reactions. (Corequisite: CHMG-141 or CHMG-131 or equivalent course.) **Lab 3, Credits 1 (Fall, Spring, Summer)**

CHMG-146**General and Analytical Chemistry II Lab**

The course combines hands-on laboratory exercises with workshop-style problem sessions to complement the CHMG-142 lecture material. The course emphasizes the use of experiments as a tool for chemical analysis and the reporting of results in formal lab reports. Topics include the quantitative analysis of a multicomponent mixture using complexation and double endpoint titration, pH measurement, buffers and pH indicators, the kinetic study of a redox reaction, and the electrochemical analysis of oxidation reduction reactions. (Prerequisites: CHMG-131 or CHMG-141 or equivalent course. Corequisites: CHMG-142 or equivalent course.) **Lab 3, Credits 1 (Fall, Spring, Summer)**

CHMG-201**Introduction to Organic Polymer Technology**

The first part of the course covers the fundamentals of organic chemistry. The organization, nomenclature, structure, bonding and basic reactions of organic compounds will be discussed, in particular those concepts that are relevant to understand polymer chemistry. The second part of the course will introduce the nomenclature and classification of synthetic polymers. The reactions leading to the formation of relevant polymers, their chemical and physical behavior, and some of their many applications will be discussed. (Prerequisites: CHMG-121 or CHMG-131 or CHMG-141 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

CHMI-351**Descriptive Inorganic Chemistry**

This course covers descriptive inorganic reactions in terms of periodic trends. Topics will include nucleosynthesis and the birth of the universe, applications used in large-scale industrial processes and their environmental impacts, nanostructured materials, and bonding theory will also be discussed. A detailed study of solid-state chemistry and structure will also be addressed. (Prerequisite: CHMO-231 or CHMO-331 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

CHMI-564**Structural Inorganic Chemistry**

This course will teach students how the properties of inorganic materials are explained by current theories including group theory, molecular orbital theory, acid-base chemistry and solid state chemistry. The topics discussed in this course include molecular structure, coordination nomenclature and isomerization, symmetry, molecular orbital theory, metallic bonding and ionic bonding. (Prerequisite: CHMO-332 or CHMO-232 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

CHMI-565**Preparative Inorganic Chemistry Lab**

This course provides a laboratory environment for students to learn the strategies necessary to synthesize a wide variety of inorganic compounds and organometallic complexes. Students will learn how to plan and develop synthetic protocols in both atmospheric and inert reaction processes. This course is intended to give an opportunity to develop innovative skills and writing proficiency. Library, literature and textbook research will be required. (Prerequisites: CHMI-351 or equivalent course.) **Lab 8, Credits 2 (Spring)**

CHMO-231**Organic Chemistry I**

This course is a study of the structure, nomenclature, reactions and synthesis of the following functional groups: alkanes, alkenes, alkynes. This course also introduces chemical bonding, IR and NMR spectroscopy, acid and base reactions, stereochemistry, nucleophilic substitution reactions, and alkene and alkyne reactions. In addition, the course provides an introduction to the use of mechanisms in describing and predicting organic reactions. (Prerequisites: CHMG-142 or CHMG-131 or equivalent course. Corequisites: CHMO-235 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

CHMO-232**Organic Chemistry II**

This course is a continuation of the study of the structure, nomenclature, reactions and synthesis of the following functional groups: aromatic systems, alcohols, ethers, epoxides, and carbonyls. This course will introduce the use of mechanisms in describing and predicting organic reactions. (Prerequisites: CHMO-231 or CHMO-331 or equivalent course. Corequisites: CHMO-236 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

CHMO-235**Organic Chemistry Lab I**

This course trains students to perform techniques important in an organic chemistry lab. The course also covers reactions from the accompanying lecture CHMO-231. (Corequisite: CHMO-231 or equivalent course.) **Lab 3, Credits 1 (Fall, Spring, Summer)**

CHMO-236**Organic Chemistry Lab II**

This course teaches students to apply basic lab techniques to organic synthetic experiments reactions covered in the accompanying lecture COS-CHMO-232. This course will also help students to solidify the concepts taught in lecture. The course will continue to instruct students in maintaining a professional lab notebook. (Prerequisites: CHMO-235 or equivalent course. Corequisites: CHMO-232 or equivalent course.) **Lab 3, Credits 1 (Fall, Spring)**

CHMO-331**Comprehensive Organic Chemistry I**

This course is a rigorous study of the structure, nomenclature, reactions and synthesis of the following functional groups: alkanes, alkenes, and alkynes. The course will also provide an introduction to chemical bonding, IR and NMR spectroscopy, acid and base reactions, stereochemistry, nucleophilic substitution reactions, alkene, and alkyne reactions. This course will require the use of mechanisms in describing and predicting organic reactions. (Prerequisites: CHEM-151 or equivalent course. Corequisites: CHMO-335 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

CHMO-332**Comprehensive Organic Chemistry II**

This course is a comprehensive study of the structure, reactions and synthesis of the following functional groups: aromatic rings, ketones, aldehydes, and carboxylic acids and their derivatives. Students will apply their knowledge from CHMO-331 to predict products and derive mechanisms that describe various organic reactions. **Lecture 3, Credits 3 (Fall)**

CHMO-335**Comprehensive Organic Chemistry Lab I**

This course prepares students to perform techniques important in an organic chemistry lab and to carryout reactions covered in the accompanying lecture CHMO-331. (Corequisites: CHMO-331 or equivalent course.) **Lab 4, Credits 1 (Spring)**

CHMO-336**Comprehensive Organic Chemistry Lab II**

This course teaches students to perform techniques important in an organic chemistry lab and reactions covered in the accompanying lecture CHMO-332. This course will also help students to solidify the concepts taught in lecture and perform qualitative analysis of unknown compounds. Students are expected to do significant work outside of lab. (Prerequisites: CHMO-335 or equivalent course. Corequisites: CHMO-332 or equivalent course.) **Lab 4, Credits 2 (Fall)**

CHMO-535**Advanced Techniques in Organic Synthesis**

This advanced lab course teaches students to perform advanced techniques important in an organic chemistry lab. Techniques covered include working under inert atmospheres, working with air-sensitive reagents, using syringes, purification methods, and carrying on material for subsequent synthetic steps. Characterization of synthesized compounds will be conducted. (Prerequisite: CHMO-335 or CHMO-235 or equivalent course.) **Lab 3, Credits 2 (Spring)**

CHMP-441**Physical Chemistry I**

This course provides fundamental concepts, and organizing principles, applied in all aspects of chemistry and related fields. A rigorous and detailed explanation of central, unifying concepts in thermodynamics and chemical kinetics will be developed. Mathematical models that provide quantitative predictions will be described for thermodynamics and chemical kinetics. These contain the mathematical underpinnings to concepts applied in analytical, inorganic, organic, and biochemistry courses, as well as more advanced topics in chemistry. The course will cover: gases, temperature, energy and the First Law of Thermodynamics, entropy and the Second and Third laws, Helmholtz and Gibbs free energies, criteria for equilibrium and spontaneity, chemical equilibrium, electrochemistry, kinetic molecular theory and chemical kinetics. (Prerequisites: MATH-219 or MATH-251 or STAT-145 and PHYS-211 or equivalent course.) **Lecture 4, Credits 3 (Fall, Spring)**

CHMP-442**Physical Chemistry II**

This course provides fundamental concepts, and organizing principles of quantum chemistry, applied in all aspects of chemistry and related fields. A rigorous and detailed explanation of central, unifying concepts in quantum chemistry will be developed. Mathematical models will be described, which contain the underpinnings to concepts applied in analytical, inorganic, organic, and biochemistry courses, as well as more advanced topics in chemistry. The course will cover: Postulates and formulation of Schrödinger equations, Operators and matrix elements, Solutions for the particle-in-a-box, simple harmonic oscillators, the rigid rotor and angular momentum, the hydrogen atom; spin, the Pauli principle. Approximation methods will be described for the helium atom, the hydrogen molecule ion, the hydrogen molecule, Diatomic molecules. Linear combinations of atomic orbitals and computational chemistry will be introduced and quantum chemistry applications will be provided. In addition this course will cover standard thermodynamic functions expressed in partition functions and spectroscopy and light-matter interaction (Prerequisite: CHMP-441 and (MATH-233 or (MATH-231 and MATH-241)) or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

CHMP-445**Experimental Physical Chemistry**

An advanced laboratory course on the use of wet chemical and instrumental analysis to apply, test and formulate physical and mathematical models to explain chemical phenomena. Emphasis is placed on formulating a scientific argument, supported by experimental evidence and established theories, and presented in a formal technical report. (Prerequisites: CHMP-441 or equivalent course. Co-requisites: CHMP-442 or equivalent course.) **Lec/Lab 7, Credits 3 (Fall, Spring)**

Color Science**CLRS-101****Art of Science of Art**

Art of Science of Art is a weekly forum in which students will be introduced to and discuss historical and current topics relating art and science with one another. Examples might include understanding human perception of the world in comparison with artistic renderings, the effects of lighting on the permanence and appearance of artwork, the creation of artists' materials (e.g. the science of pigments), and art conservation/restoration in the physical and digital domains. This seminar provides an introductory and over-arching context for students in the Art of Science / Science of Art minor. It focuses on journal club discussions of readings selected by the students and faculty. It also includes oral presentations from students and faculty as well as visiting speakers from within and external to RIT. Students will complete oral presentations and written assignments based on the course readings and independent research. **Lecture 1, Credits 1 (Fall)**

CLRS-189**Special Topics**

This is an introductory course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. **Lecture 3, Credits 3 (Fall, Spring, Summer)**

CLRS-201**Color Science for the Visual Arts**

Color has been a topic of intense interest and inquiry for thousands of years. Knowledge of color science can be an aid to visual artists and those who study the visual arts such as art historians and conservators. Topics include the building blocks of color, seeing color, producing color, displaying color, reproducing color, and conserving color. **Lecture 3, Credits 3 (Spring)**

CLRS-289**Special Topics**

This is a lower-level course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lec/Lab, Credits 1 - 4 (Fall, Spring, Summer)**

CLRS-298**Color Science Independent Study**

This course is a faculty-directed exploration of appropriate color science topics that are not part of the formal curriculum. The level of study is appropriate for student in their first three years of study. **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**

CLRS-389**Special Topics**

This is an upper-level course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lec/Lab, Credits 1 - 4 (Fall, Spring, Summer)**

CLRS-489**Special Topics**

This is an advanced course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lec/Lab, Credits 1 - 4 (Fall, Spring, Summer)**

CLRS-498 Color Science Advanced Independent Study

This course is a faculty-directed exploration of appropriate advanced color science topics that are not part of the formal curriculum. The level of study is appropriate for student in their final two years of study. **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**

CLRS-589 Special Topics

This is an advanced course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. **Lec/Lab, Credits 1 - 4 (Fall, Spring, Summer)**

Environmental Science

ENVS-101 Concepts of Environmental Science

This course is the foundation course for the Environmental Science major and presents an integrated approach to the interrelated, interdisciplinary principles of environmental science through lecture, case studies and active participation. In this course, the focus will be on sustainability as the foundation for problem solving while investigating a number of environmental issues and establishing environmental literacy. Topics may include biodiversity, ecosystems, pollution, energy, and global climate change. To demonstrate the interdisciplinary methodology of environmental science, elements of government/political science/policy, ethics, economics, sociology, history and engineering are embedded in the scientific matrix used to present this course. **Lecture 3, Credits 3 (Fall, Spring)**

ENVS-102 Environmental Concepts Lab

This course is the laboratory component of the foundation course for the Environmental Science major. Through in-class exercises, outside labs, and field trips, students will begin to learn problem solving and analytical skills needed to investigate and address complex environmental issues. Topics may include assessing campus biodiversity and ecosystems, calculating personal and campus ecological footprints and sustainability indices, environmental modeling, and campus sustainability efforts. To demonstrate the interdisciplinary methodology of environmental science, elements of government/political science/policy, ethics, economics, sociology, and history are embedded in the scientific matrix used to present this course. (Co-requisites: ENVS-101 or equivalent course.) **Lab 3, Credits 1 (Fall)**

ENVS-111 Soil Science

This is an introductory course on soil science, covering concepts such as soil taxonomy, soil ecology, physical soil properties, soil formation and geomorphology, and soil conservation. The lecture portion of the course will consist of in-class demonstrations and exercises, discussion groups, and traditional lecture materials. Lab exercises will focus on field sampling techniques and bench analyses, soil texture and partial size analyses, basic soil chemistry properties, land use planning, and spatial analyses. **Lab 3, Credits 4 (Fall)**

ENVS-111 Soil Science

This is an introductory course on soil science, covering concepts such as soil taxonomy, soil ecology, physical soil properties, soil formation and geomorphology, and soil conservation. The lecture portion of the course will consist of in-class demonstrations and exercises, discussion groups, and traditional lecture materials. Lab exercises will focus on field sampling techniques and bench analyses, soil texture and partial size analyses, basic soil chemistry properties, land use planning, and spatial analyses. **Lecture 3, Credits 4 (Fall)**

ENVS-150 Ecology of the Dalmatian Coast

This course is an introduction to population, community, and ecosystem ecology; stressing the dynamic interrelationships of plant and animal communities of the Dalmatian Coast. The course includes such ecological concepts as energy flow and trophic levels in natural communities, population and community dynamics, biogeography and ecosystem ecology. Field trips to local Croatian ecosystems are included. **Lab 2, Credits 4 (Spring)**

ENVS-150 Ecology of the Dalmatian Coast

This course is an introduction to population, community, and ecosystem ecology; stressing the dynamic interrelationships of plant and animal communities of the Dalmatian Coast. The course includes such ecological concepts as energy flow and trophic levels in natural communities, population and community dynamics, biogeography and ecosystem ecology. Field trips to local Croatian ecosystems are included. **Lecture 3, Credits 4 (Spring)**

ENVS-151 Scientific Inquiries in Environmental Science

This course is part of a two-semester sequence that when combined presents an integrated approach to the interrelated, interdisciplinary principles of environmental science through case studies, site visits, and field work. Through assigned readings, classroom discussion and case studies dealing with global environmental issues as well as the environmental issues related to the Dalmatian coast, students will learn how to critically analyze environmental problems from a multidisciplinary perspective and to propose solutions. **Lab 2, Credits 4 (Fall)**

ENVS-151 Scientific Inquiries in Environmental Science

This course is part of a two-semester sequence that when combined presents an integrated approach to the interrelated, interdisciplinary principles of environmental science through case studies, site visits, and field work. Through assigned readings, classroom discussion and case studies dealing with global environmental issues as well as the environmental issues related to the Dalmatian coast, students will learn how to critically analyze environmental problems from a multidisciplinary perspective and to propose solutions. **Lecture 3, Credits 4 (Fall)**

ENVS-152H Honors: the Greening of RIT

Environmental issues are often difficult to address because stakeholders have different values, backgrounds, culture, risk perception, and understanding of science. This class will empower students to be effective advocates by helping them to learn about different viewpoints and considerations surrounding environmental issues. Students will have an opportunity to improve their problem-solving abilities by addressing interdisciplinary environmental, ecological, and sustainability problems in miniature on the campus of RIT. During the semester, students will research methods and strategies used by other colleges and universities to minimize environmental impacts in areas such as energy use, solid and hazardous waste management, transportation, landscaping and construction, preserving green space and natural systems (ecosystem functions and services), storm water runoff, food production and consumption, and purchasing. Student solutions to campus issues and projects will address the concept of sustainability and the tradeoffs it requires. (This class is restricted to students in the Honors program.) **Lec/Lab 3, Credits 3 (Fall)**

ENVS-189 Introductory Special Topics

This is an introductory course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lec/Lab, Credits 1 - 4 (Fall, Spring, Summer)**

ENVS-201 Environmental Workshop

This workshop serves as the second core course for the Environmental Science major. Through in-class exercises, outside labs, and field trips, students will begin to learn problem solving and analytical skills needed to investigate and address environmental issues. Topics may include assessing campus biodiversity and ecosystems, calculating personal and campus ecological footprints and sustainability indexes, environmental modeling, and campus sustainability projects. To demonstrate the interdisciplinary methodology of environmental science, elements of government/political science/policy, ethics, economics, sociology, and history are embedded in the scientific matrix used to present this course. (Prerequisites: ENVS-101 or STSO-220 or equivalent course.) **Lec/Lab 3, Credits 3 (Spring)**

ENVS-241 Earth Systems Dynamics

This course is a general elective offering that will expose students to earth systems dynamics, i.e., the lithosphere, hydrosphere, atmosphere, and terrestrial components, and their interactions at a global scale. The course also offers introductions to regional and local scale interactions, as well as societal impacts, e.g., science, engineering, policy, and economics. This course will provide students with the critical thinking skills to evaluate the underlying science of system components, how they fluctuate, interact via feedback loops, their carbon and energy dynamics, and what this means for society as a whole. Special focus will be given to remote sensing methods for assessing global system dynamics, including satellite image analysis. This offering will include theoretical background, guest lecturers, and class discussion centered on prominent topics, e.g., climate change and the science behind this. (Academic Level 2, Degree Seeking students.) **Lab 2, Credits 3 (Fall)**

ENVS-241 Earth Systems Dynamics

This course is a general elective offering that will expose students to earth systems dynamics, i.e., the lithosphere, hydrosphere, atmosphere, and terrestrial components, and their interactions at a global scale. The course also offers introductions to regional and local scale interactions, as well as societal impacts, e.g., science, engineering, policy, and economics. This course will provide students with the critical thinking skills to evaluate the underlying science of system components, how they fluctuate, interact via feedback loops, their carbon and energy dynamics, and what this means for society as a whole. Special focus will be given to remote sensing methods for assessing global system dynamics, including satellite image analysis. This offering will include theoretical background, guest lecturers, and class discussion centered on prominent topics, e.g., climate change and the science behind this. (Academic Level 2, Degree Seeking students.) **Lecture 2, Credits 3 (Fall)**

ENVS-250 Applications of Geographic Information Systems

Through hands-on projects and case studies, this course illustrates concepts and applications of raster and vector geographic information systems (GIS) in a variety of disciplines, such as environmental science, biology, geology, geography, sociology, and economics. Students will learn how to use GIS software and spatial analyses, plan a project, create a database, and conduct an independent project. Students should have completed a foundational course in their major and be comfortable working with computers. Experience with programming is also useful. (Foundational course in student's major field of study or permission of instructor.) **Lec/Lab 6, Credits 4 (Fall)**

College of Science

ENVS-289 **Intermediate Special Topics**
This is an intermediate course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lec/Lab, Credits 1 - 4 (Fall, Spring, Summer)**

ENVS-295 **Environmental Science Research**
This course is a faculty-directed student project or research involving laboratory work, computer modeling, or theoretical calculations that could be considered of an original nature. The level of study is appropriate for students in their first three years of study. (This course requires permission of the Instructor to enroll.) **Research, Credits 1 - 4 (Fall, Spring, Summer)**

ENVS-298 **Environmental Science Independent Study**
This course is a faculty-directed tutorial of appropriate topics that are not part of the formal curriculum. The level of study is appropriate for student in their first three years of study. (This course requires permission of the Instructor to enroll.) **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**

ENVS-301 **Environmental Science Field Skills**
Environmental Science Field Skills presents an integrated approach to the interrelated, interdisciplinary principles of environmental science through case studies, site visits and field work. In this course, the focus will be on learning methods for environmental analysis, including experimental design, water and soil quality, primary production and biodiversity, land use/land cover change and ecosystem restoration. The course will culminate in a stressed stream analysis of a local watershed. Additional topics may include geographic information systems, wetlands, environmental education and sustainable food production. The interdisciplinary nature of environmental science will be illustrated through elements of government/political science/policy, ethics, economics, sociology, history and engineering. (Prerequisites: ((BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (BIOL-123 and BIOL-124 and BIOL-125 and BIOL-126)) and CHMG-141 and CHMG-145 and ENVS-101 and ENVS-102 or equivalent courses.) **Lab 3, Credits 4 (Spring)**

ENVS-301 **Environmental Science Field Skills**
Environmental Science Field Skills presents an integrated approach to the interrelated, interdisciplinary principles of environmental science through case studies, site visits and field work. In this course, the focus will be on learning methods for environmental analysis, including experimental design, water and soil quality, primary production and biodiversity, land use/land cover change and ecosystem restoration. The course will culminate in a stressed stream analysis of a local watershed. Additional topics may include geographic information systems, wetlands, environmental education and sustainable food production. The interdisciplinary nature of environmental science will be illustrated through elements of government/political science/policy, ethics, economics, sociology, history and engineering. (Prerequisites: ((BIOL-101 and BIOL-102 and BIOL-103 and BIOL-104) or (BIOL-121 and BIOL-122) or (BIOL-123 and BIOL-124 and BIOL-125 and BIOL-126)) and CHMG-141 and CHMG-145 and ENVS-101 and ENVS-102 or equivalent courses.) **Lecture 3, Credits 4 (Spring)**

ENVS-305 **Urban Ecology**
Urban Ecology focuses first on the natural systems of urban areas and how those systems function in an undisturbed setting, with an emphasis on the types of ecosystem functions and services natural systems provide. Second, the course focuses on how humans have impacted those natural systems through urban development, and how those impacts can be mitigated or avoided by using the examples provided by nature to influence more sustainable development and maintain (or even enhance) ecological functions and services in urban landscapes. The course will examine and compare examples of several urban settings from around the world, paying particular attention to the connections between the physical, social and cultural aspects of sustainability. The course will meet during spring semester, with a required 2.5-week study tour to Malmö, Sweden after graduation in May. Students must apply through the Office of Study Abroad and an additional fee applies to the course. (Prerequisites: This class is restricted to students with at least 2nd year standing.) **Lecture 2, Credits 3 (Spring)**

ENVS-311 **Wetlands**
This is a course on the interactions of vegetation, soils, and hydrology that characterize wetlands. Ecosystem characteristics and processes are emphasized. Wetland policies, regulations, classification, and value systems are also covered. Field work and hands-on learning are integrated into the course through projects and field trips. (Prerequisites: BIOL-240 or equivalent course.) **Lec/Lab 4, Credits 4 (Fall)**

ENVS-389 **Special Topics**
This is an advanced course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lec/Lab, Credits 1 - 3 (Fall, Spring, Summer)**

ENVS-399 **Environmental Science Part-Time Cooperative Experience**
This course is a part time cooperative education experience for undergraduate students majoring in environmental science. **CO OP, Credits 0 (Fall, Spring, Summer)**

ENVS-489 **Advanced Special Topics**
This is an advanced course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (Academic Level 3, Degree Seeking students.) **Lec/Lab, Credits 1 - 4 (Fall, Spring, Summer)**

ENVS-495 **Advanced Environmental Science Research**
This course is a faculty-directed student project or research involving laboratory or field work, computer modeling, or theoretical calculations that could be considered of an original nature. The level of study is appropriate for students in their final two years of study. (This course requires permission of the Instructor to enroll.) **Research, Credits 1 - 4 (Fall, Spring, Summer)**

ENVS-498 **Advanced Environmental Science Independent Study**
This course is a faculty-directed tutorial of appropriate topics that are not part of the formal curriculum. The level of study is appropriate for student in their final two years of study. (This course requires permission of the Instructor to enroll.) **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**

ENVS-499 **Environmental Science Co-op**
Cooperative education experience for undergraduate environmental science students. **CO OP, Credits 0 (Fall, Spring, Summer)**

ENVS-500 **Experiential Learning Requirement in Environmental Science**
The experiential learning (EL) requirement may be fulfilled through a variety of methods including co-op, undergraduate research, summer research experiences, study abroad relevant to the major, designated EL courses, etc. All experiences must be approved by the GSOLS EL Committee. Successful completion of the required elements will result in a grade of S in this course. **Lecture, Credits 0 (Fall, Spring, Summer)**

ENVS-531 **Climate Change: Science Technology and Policy**
This multidisciplinary course will provide students with diverse perspectives on global climate change issues, providing a survey of important aspects of the problem. Topics include atmospheric chemistry, climate modeling, ecological impacts and feedbacks, economics of climate change, international climate policies, and social and environmental justice. The course will include a variety of instructors and guest lecturers, providing an overview of the complex and inter-related nature of global climate change. (This class is restricted to undergraduate students with at least 3rd year standing.) **Lecture 3, Credits 3 (Spring)**

ENVS-550 **Hydrologic Applications of Geographic Information Systems**
Aerial photography, satellite imagery, Global Positioning Systems (GPS), and Geographic Information Systems (GIS) are extremely useful tools in hydrologic modeling and environmental applications such as rainfall runoff modeling, pollution loading, landscape change analyses, and terrain modeling. This course will: 1) introduce students to spatial analysis theories, techniques and issues associated with hydrologic and environmental applications; 2) provide hands-on training in the use of these spatial tools and models while addressing a real problem; 3) provide experience linking GIS and model results to field assessments and monitoring activities; and 4) enable students to solve a variety of spatial and temporal hydrologic and environmental problems. (Prerequisites: ENVS-250 or equivalent course.) **Studio 6, Credits 4 (Spring)**

ENVS-551 **Environmental Science Capstone Seminar I**
This course brings together all of the principles of Environmental Science the student has learned during his/her four year undergraduate education at RIT. To accomplish this, students will work in teams to provide solutions to a real environmental problem or issue. In addition to working with RIT faculty, the students will work with practicing environmental scientists and the public. This first course will focus on problem definition, developing a problem solving strategy, and begin data collection and background analyses. Students will present their preliminary findings to the client through presentations and status reports. (This course is restricted to 4th year students in the ENVS-BS, ENVS-2M and ENVS-MN programs.) **Lec/Lab 3, Credits 3 (Fall)**

ENVS-552 **Environmental Science Capstone Seminar II**
This course continues to bring together all of the principles of Environmental Science the student has learned during his/her four year undergraduate education at RIT as the follow-up to the first capstone course. Students will work in teams to provide solutions to a real environmental problem or issue. In addition to working with RIT faculty, the students will work with practicing environmental scientists and the public. This second course will focus on refining the methodology and strategy proposed to address the environmental issue, continue data collection and background analyses, interpret results, and propose solutions to the assigned problem. Students will generate a final report and present their findings to the clients. (Prerequisites: ENVS-551 or equivalent course.) **Lec/Lab 3, Credits 3 (Spring)**

ENVS-589**Special Topics**

This is an advanced course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lec/Lab, Credits 1 - 3 (Fall, Spring, Summer)**

General Science**GSCI-101****Science Exploration I**

This course prepares students within the College of Science for choosing a major through an intensive, team-based research project. The project is selected each year by the faculty and is presented to the class as a goal. The students will self-organize into groups, define group sub-goals, conduct research, communicate their results on a weekly basis, and integrate the modules into a final, complete research paper that is presented at the end of the second term. Students will be graded on their teamwork, individual and group creativity, scientific rigor, thoroughness of supporting research results, and the overall quality of the final research paper. **Lecture 3, Credits 3 (Fall)**

GSCI-102**Science Exploration II**

This course continues to prepare students within the College of Science for choosing a major through an intensive, team-based research project. The project is selected each year by the faculty and is presented to the class as a goal. The students will self-organize into groups, define group sub-goals, conduct research, communicate their results on a weekly basis, and integrate the modules into a final, complete research paper that is presented at the end of the third term. Students will be graded on their teamwork, individual and group creativity, scientific rigor, thoroughness of supporting research results, and the overall quality of the final research paper. Students will present a formal project report at the end of the term to faculty and staff. **Lecture 3, Credits 3 (Spring)**

Imaging Science**IMGS-111****Imaging Science Fundamentals**

This course is an exploration of the fundamentals of imaging science and the imaging systems of the past, present, and future. Imaging systems studied include the human visual system, consumer and entertainment applications (e.g., traditional and digital photography, television, digital television, HDTV, and virtual reality); medical applications (e.g., X-ray, ultrasound, and MRI); business/document applications (e.g., impact and non-impact printing, scanners, printers, fax machines, and copiers) and systems used in remote sensing and astronomy (e.g., night-vision systems, ground- and satellite-based observatories). The laboratory component reinforces the principles and theories discussed in the lecture, while giving students experience with many imaging systems and exposure to the underlying scientific principles. **Lab 3, Credits 3 (Fall)**

IMGS-112**Imaging Science Fundamentals**

This course is an exploration of the fundamentals of imaging science and the imaging systems of the past, present, and future. Imaging systems studied include the human visual system, consumer and entertainment applications (e.g., traditional and digital photography, television, digital television, HDTV, and virtual reality); medical applications (e.g., X-ray, ultrasound, and MRI); business/document applications (e.g., impact and non-impact printing, scanners, printers, fax machines, and copiers) and systems used in remote sensing and astronomy (e.g., night-vision systems, ground- and satellite-based observatories). The laboratory component reinforces the principles and theories discussed in the lecture, while giving students experience with many imaging systems and exposure to the underlying scientific principles. **Lecture 2, Credits 3 (Fall)**

IMGS-112**Astronomical Imaging Fundamentals**

This course provides an understanding and appreciation of the fundamental science goals driving the development of contemporary astronomical imaging systems and the basic principles and concepts underlying those systems. Students will investigate the world's most powerful telescopes and cameras presently operating in the realm of human vision, as well as systems that image the "invisible", by tapping the infrared, X-ray, and radio regimes of the electromagnetic spectrum. Laboratory exercises familiarize students with basic visualization, manipulation, and measurement of real astronomical images (drawn from major-facility archives) that span these regimes. Students will also get a glimpse of the future of astronomical imaging. This course satisfies a General Education elective requirement in the areas of natural science inquiry, scientific principles, or science/math literacy. Math proficiency at college algebra level is required. **Lab 3, Credits 3 (Spring)**

IMGS-112**Astronomical Imaging Fundamentals**

This course provides an understanding and appreciation of the fundamental science goals driving the development of contemporary astronomical imaging systems and the basic principles and concepts underlying those systems. Students will investigate the world's most powerful telescopes and cameras presently operating in the realm of human vision, as well as systems that image the "invisible", by tapping the infrared, X-ray, and radio regimes of the electromagnetic spectrum. Laboratory exercises familiarize students with basic visualization, manipulation, and measurement of real astronomical images (drawn from major-facility archives) that span these regimes. Students will also get a glimpse of the future of astronomical imaging. This course satisfies a General Education elective requirement in the areas of natural science inquiry, scientific principles, or science/math literacy. Math proficiency at college algebra level is required. **Lecture 2, Credits 3 (Spring)**

IMGS-180**Object-Oriented Scientific Computing**

This project-based course is an introduction to object-oriented computer programming directed at solving scientific problems related to imaging. The student will learn the concepts of object-oriented programming using the most recent C++ programming language standard. Popular project management and modern compilation/build systems will be presented and utilized. Fundamentals of streamed input and output, data types, objects and classes, templates, lambda expressions, flow control, repetition, program decomposition and library development, software engineering/design concepts, and problem-solving approaches such as the use of randomness, divide-and-conquer, Monte Carlo simulation, ill-posed solutions, and search will be examined in detail and applied to scientific, mathematical, and imaging-specific problems. In addition to the base language concepts, students will utilize popular open-source and public-domain libraries such as Boost, Eigen, and OpenCV. (This class is restricted to IMGS-BS or DIGCIME-BS Major students.) **Lecture 3, Credits 3 (Spring)**

IMGS-181**Freshman Imaging Project I**

Freshman Imaging Project I is the first of a two-course sequence. Through the exploration of concepts in physics, mathematics, and computer science, students will experience the creation of a system to address a contemporary technological need through the application of the principles of the scientific method. With the help of faculty and staff from different departments across campus, as well as external experts, students will plan and organize the effort, review current literature applicable to the posed technical challenge, apply hypotheses to address presented scientific questions, conduct experiments to assess technology options, integrate components to create a prototype, and confirm that the prototype and methods meet desired levels of performance. The students will develop a working knowledge of the scientific method and an appreciation for the value of teamwork in technical disciplines, develop the skills required to execute a large project, and increase proficiency in oral and written technical communication. (Academic Level 1, Degree Seeking students.) **Lec/Lab 3, Credits 3 (Fall)**

IMGS-182**Freshman Imaging Project II**

Freshman Imaging Project II is the second of a two-course sequence aimed at designing, developing, and building a functional imaging system that will be useful to a "real world" external constituency to achieve its technical goals. With help from faculty and staff from imaging science and other departments across campus, the unified team of students will plan and organize the effort, assess technology options, integrate components, and confirm that the system meets desired levels of performance. Students will develop a general understanding of the foundational concepts of imaging science, a working knowledge of the principles of systems engineering, an appreciation for the value of teamwork in technical disciplines, and practice oral and written technical communication. In this second course of the sequence, students proceed with construction and testing of their system that was designed in COS-IMGS-181. (Prerequisites: MATH-171 or MATH-181 or equivalent course. Co-requisites: (MATH-172 or MATH-173 or MATH-182) and (PHYS-211 or PHYS-211A).) **Lec/Lab 3, Credits 3 (Spring)**

IMGS-189**Special Topics**

This is an introductory course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. **Lec/Lab, Credits 1 - 3 (Fall, Spring, Summer)**

IMGS-211**Probability and Statistics for Imaging**

This course introduces the principles of probability and statistics that are used in imaging science. The first half of the course covers probability distributions for discrete and continuous random variables, expectation, variance, and joint distributions. The second half of the course will consider point estimation, statistical intervals, hypothesis testing, inference, and linear regression. (Prerequisites: MATH-173 or MATH-182 or MATH-182A or equivalent course. Students cannot take and receive credit for this course if they have taken MATH-251.) **Lecture 3, Credits 3 (Spring)**

IMGS-221**Vision and Psychophysics**

This course presents an overview of the organization and function of the human visual system and some of the psychophysical techniques used to study visual perception. (This course is restricted to IMGS-BS, DIGCIME-BS, IMGS-MN and SCIMGS-IM students.) **Lecture 3, Credits 3 (Fall, Spring)**

IMGS-230H**The New Music of the Spheres**

This course traces human understanding of resonances and their significance – from the ideas of Pythagoras and Kepler concerning the potential relationships between musical intervals and planetary motion (the "Music of the Spheres"), to the work of contemporary astronomers discovering and characterizing planets orbiting other stars ("exoplanets"). Along the way, essential methods, discoveries, and recent developments in the study of our own solar system and exoplanets – including theories for and observations of the origins of planetary systems – are investigated, as are the physical and mathematical concepts necessary to describe sound, light, & gravity. (Prerequisites: PHYS-112 or 1017-213 or PHYS-212 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

IMGS-241**Earth System Dynamics I**

This course is the first of a two-course sequence, general elective offering that will expose students to earth systems dynamics, i.e., the lithosphere, hydrosphere, atmosphere, and terrestrial components, and their interactions at a global scale. The course also offers introductions to regional and local scale interactions, as well as societal impacts, e.g., science, engineering, policy, and economics. This course will provide students with the critical thinking skills to evaluate the underlying science of system components, how they fluctuate, interact, and what this means for society as a whole. This will include theoretical background, guest lecturers, class discussion centered on prominent topics, e.g., global warming and the science behind this, and a class project that focuses on global scale interactions and their relevance to scientific, engineering, social, and economic endeavors. (This class is restricted to undergraduate students with at least 2nd year standing.) **Lab 2, Credits 3 (Fall)**

IMGS-241**Earth System Dynamics I**

This course is the first of a two-course sequence, general elective offering that will expose students to earth systems dynamics, i.e., the lithosphere, hydrosphere, atmosphere, and terrestrial components, and their interactions at a global scale. The course also offers introductions to regional and local scale interactions, as well as societal impacts, e.g., science, engineering, policy, and economics. This course will provide students with the critical thinking skills to evaluate the underlying science of system components, how they fluctuate, interact, and what this means for society as a whole. This will include theoretical background, guest lecturers, class discussion centered on prominent topics, e.g., global warming and the science behind this, and a class project that focuses on global scale interactions and their relevance to scientific, engineering, social, and economic endeavors. (This class is restricted to undergraduate students with at least 2nd year standing.) **Lecture 2, Credits 3 (Fall)**

IMGS-251**Radiometry**

This course introduces the concepts of quantitative measurement of electromagnetic energy. The basic radiometric and photometric terms are introduced using calculus-based definitions. Governing equations for source propagation and sensor output are derived. Simple source concepts are reviewed and detector figures of merit are introduced and used in problem solving. The radiometric concepts are then applied to simple imaging systems so that a student could make quantitative measurements with imaging instruments. (Prerequisites: MATH-182 or MATH-182A or MATH-173 and PHYS-212 or equivalent courses.) **Lab 3, Credits 3 (Fall)**

IMGS-251**Radiometry**

This course introduces the concepts of quantitative measurement of electromagnetic energy. The basic radiometric and photometric terms are introduced using calculus-based definitions. Governing equations for source propagation and sensor output are derived. Simple source concepts are reviewed and detector figures of merit are introduced and used in problem solving. The radiometric concepts are then applied to simple imaging systems so that a student could make quantitative measurements with imaging instruments. (Prerequisites: MATH-182 or MATH-182A or MATH-173 and PHYS-212 or equivalent courses.) **Lecture 2, Credits 3 (Fall)**

IMGS-261**Linear and Fourier Methods for Imaging**

This course develops the concepts of complex numbers and linear algebra for describing imaging systems in the frequency domain via the discrete and continuous Fourier transforms. (Prerequisite: MATH-173 or MATH-182 or MATH-182A or equivalent course.) **Lecture 4, Credits 4 (Spring)**

IMGS-290**Introduction to Scientific Research**

This course will expose a student who is in the early stages of their post-secondary education to the process of conducting scientific research in an established university research laboratory setting. The student will perform experiments, document results, present their findings, and work closely with a faculty mentor who will design the research to be conducted. It is anticipated that this may be the student's first exposure to the field in which they are conducting research and the importance of background research and literature review will be emphasized. (This course requires permission of the Instructor to enroll.) **Research, Credits 1 - 4 (Fall, Spring, Summer)**

IMGS-321**Geometric Optics**

This course introduces the analysis and design of optical imaging systems based on the ray model of light. Topics include reflection, refraction, imaging with lenses, stops and pupils, prisms, magnification and optical system design using computer software. (Prerequisites: PHYS-212 or equivalent course.) **Lab 3, Credits 3 (Fall)**

IMGS-321**Geometric Optics**

This course introduces the analysis and design of optical imaging systems based on the ray model of light. Topics include reflection, refraction, imaging with lenses, stops and pupils, prisms, magnification and optical system design using computer software. (Prerequisites: PHYS-212 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

IMGS-322**Physical Optics**

Light waves having both amplitude and phase will be described to provide a foundation for understanding key optical phenomena such as interference, diffraction, and propagation. Starting from Maxwell's equations the course advances to the topic of Fourier optics. (Prerequisites: (PHYS-212 and IMGS-261) or (PHYS-283 and PHYS-320) or equivalent courses.) **Lab 3, Credits 3 (Spring)**

IMGS-322**Physical Optics**

Light waves having both amplitude and phase will be described to provide a foundation for understanding key optical phenomena such as interference, diffraction, and propagation. Starting from Maxwell's equations the course advances to the topic of Fourier optics. (Prerequisites: (PHYS-212 and IMGS-261) or (PHYS-283 and PHYS-320) or equivalent courses.) **Lecture 2, Credits 3 (Spring)**

IMGS-341**Interactions Between Light and Matter**

This course introduces the principles of how light interacts with matter. The principles of atomic physics as applied to simple atoms are reviewed and extended to multi-electron atoms to interpret their spectra. Molecular structure and spectra are covered in depth, including the principles of lasers. The concepts of statistical physics concepts are introduced and applied to the structure of crystalline solids, their band structure and optical properties. These concepts are then used to understand electronic imaging devices, such as detectors. (Prerequisite: PHYS-213 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

IMGS-351**Fundamentals of Color Science**

This course will introduce students to the field of Color Science. Students will learn about the physical sources of color, the visual mechanisms that provide our experience of color, and the descriptive systems that have been developed for relating the physical and visual properties. Through hands-on projects, students will learn practical methods for measuring, modeling, and controlling color in digital imaging systems. (Prerequisites: SOFA-103 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

IMGS-361**Image Processing and Computer Vision I**

This course is an introduction to the basic concepts of digital image processing. The student will be exposed to image capture and image formation methodologies, sampling and quantization concepts, statistical descriptors and enhancement techniques based upon the image histogram, point processing, neighborhood processing, and global processing techniques based upon kernel operations and discrete convolution as well as the frequency domain equivalents, treatment of noise, geometrical operations for scale and rotation, and grey-level resampling techniques. Emphasis is placed on applications and efficient algorithmic implementation using the student's programming language of choice. (Prerequisites: IMGS-180 and IMGS-261 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

IMGS-362**Image Processing and Computer Vision II**

This course considers the more advanced concepts of digital image processing. The topics include image reconstruction, noise sources and techniques for noise removal, information theory, image compression, video compression, wavelet transformations, frequency-domain based applications, morphological operations, and modern digital image watermarking and steganography algorithms. Emphasis is placed on applications and efficient algorithmic implementation using the student's computer programming language of choice, technical presentation, and technical writing. (Prerequisites: IMGS-361 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

IMGS-371**Imaging Systems Analysis**

This course will introduce students to the theory and practice of imaging systems analysis. Students will learn about the physical factors that affect the spatial and temporal response properties of optical, electronic, and biological imaging systems, and the mathematical methods that have been developed for describing these properties. Through hands-on projects, students will learn practical methods for measuring, modeling, and controlling the spatial and temporal point spread functions (PSFs) and modulation transfer functions (MTFs) of imaging systems. (COS-IMGS-180 and COS-IMGS-261, or equivalent) (Prerequisites: IMGS-180 and IMGS-362 or equivalent courses.) **Lecture 4, Credits 4 (Fall)**

IMGS-431**Environmental Applications of Remote Sensing**

This course offers an introduction to remote sensing systems and a selection of environmental applications of remote sensing. The basic properties of electromagnetic radiation, its interaction with the atmosphere and earth surfaces (e.g., vegetation, minerals, water, etc.), and the interpretation of these interactions are dealt with in the first half of the course. This is followed by a description of airborne and spaceborne, active and passive sensors that operate throughout the electromagnetic spectrum for detecting physical phenomena. Finally, an introduction is provided to pre-processing and analysis techniques that are useful for extracting information from such sensors. The Earth's atmospheric, hydrospheric, and terrestrial processes are considered at local to regional scales. Application areas include monitoring vegetation health, measuring biomass (carbon sequestration), identifying cultural features, assessing water resources, and detecting pollution and natural hazards. (Prerequisites: ENVS-250 or equivalent course.) **Lab 3, Credits 3 (Fall)**

IMGS-431**Environmental Applications of Remote Sensing**

This course offers an introduction to remote sensing systems and a selection of environmental applications of remote sensing. The basic properties of electromagnetic radiation, its interaction with the atmosphere and earth surfaces (e.g., vegetation, minerals, water, etc.), and the interpretation of these interactions are dealt with in the first half of the course. This is followed by a description of airborne and spaceborne, active and passive sensors that operate throughout the electromagnetic spectrum for detecting physical phenomena. Finally, an introduction is provided to pre-processing and analysis techniques that are useful for extracting information from such sensors. The Earth's atmospheric, hydrospheric, and terrestrial processes are considered at local to regional scales. Application areas include monitoring vegetation health, measuring biomass (carbon sequestration), identifying cultural features, assessing water resources, and detecting pollution and natural hazards. (Prerequisites: ENVS-250 or equivalent course.) **Lecture 2, Credits 3 (Fall)**

IMGS-433**Remote Sensing Systems Engineering**

This course develops knowledge and understanding of the design and analysis of optical remote sensing systems for Earth remote sensing. Building on general imaging fundamentals learned earlier in their program, students will learn domain-specific tools and techniques for analyzing airborne and satellite sensor systems for the optical spectral imaging of Earth. Through a combination of classroom and laboratory experiences, students will learn about the propagation of photons and signals from the Sun through the formation of a digital image. The course will emphasize a linear systems modeling perspective and provide the students the background to understand, model, and predict remote sensing imaging system performance. (Prerequisites: IMGS-251 and IMGS-441 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

IMGS-441**Noise and System Modeling**

This course develops the concepts of noise modeling and random processes within the context of imaging systems. After a brief review of probability theory, the concept of image noise is introduced. Random processes are considered in both the spatial and spatial frequency domains, with emphasis on the autocorrelation function and power density spectrum. Finally, the principles of random processes are applied to signal and noise transfer in multistage imaging systems. At the completion of the course the student will be able to model signal and noise transfer within a multistage imaging system. (Prerequisites: IMGS-211 or MATH-251) and IMGS-261 and IMGS-341 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

IMGS-442**Imaging Systems Analysis and Modeling**

The purpose of this course is to develop an understanding and ability to model signal and noise within the context of imaging systems. A review of the modulation transfer function is followed by a brief review of probability theory. The concept of image noise is then introduced. Next, random processes are considered in both the spatial and frequency domains, with emphasis on the autocorrelation function and power density spectrum. Finally, the principles of random processes are applied to signal and noise transfer in multistage imaging systems. At the completion of the course the student will be able to model signal and noise transfer within a multistage imaging system. (Prerequisites: IMGS-211 and IMGS-261 and IMGS-341 and IMGS-322 or equivalent courses.) **Lecture 4, Credits 4 (Fall)**

IMGS-451**Imaging Detectors**

This course provides an overview of the underlying physical concepts, designs, and characteristics of detectors used to sense electromagnetic radiation having wavelengths ranging from as short as X-rays to as long as millimeter radiation. The basic physical concepts common to many standard detector arrays will be reviewed. Some specific examples of detectors to be discussed include photomultipliers, micro channel plates, hybridized infrared arrays, positive-intrinsic-negative (PIN) detectors, and superconductor-insulator-superconductor (SIS) mixers. The use of detectors in fields such as astronomy, high energy physics, medical imaging and digital imaging will be discussed. (Prerequisites: IMGS-251 and IMGS-341 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

IMGS-462**Multivariate Statistical Image Processing**

This course discusses the digital image processing concepts and algorithms used for the analysis of hyperspectral, multispectral, and multi-channel data in multiple imaging application areas. Concepts are covered at the theoretical and implementation level using current, popular commercial software packages and high-level programming languages to work examples, homework problems and programming assignments. The requisite multivariate statistics will be presented as part of this course as an extension of the univariate statistics that the students have previously been exposed to in the introductory statistics classes. Topics include methods for supervised data classification, clustering algorithms and unsupervised classification, multispectral data transformations, data-redundancy reduction techniques, derivation of non-spectral images features to aid in the classification process, and data fusion for resolution enhancement. (Prerequisites: IMGS-362 or equivalent course.) **Lecture 3, Credits 3**

IMGS-495**Advanced Imaging Science Research**

This course is a faculty-directed student project or research involving laboratory work, computer modeling, image analysis, or theoretical calculations that could be considered of an original nature. The level of study is appropriate for students in their final two years of study. (This course requires permission of the Instructor to enroll.) **Research, Credits 1 - 4 (Fall, Spring, Summer)**

IMGS-499**Imaging Science Co-op**

This course is a cooperative education experience for undergraduate imaging science students. **CO OP, Credits 0 (Fall, Spring, Summer)**

IMGS-500**Experiential Learning Requirement in Imaging Science**

The experiential learning (EL) requirement may be fulfilled through a variety of methods including capstone, co-op, undergraduate research, summer research experiences, study abroad relevant to the major, designated EL courses, etc. All experiences must be approved by the Center for Imaging Science. Successful completion of the required elements will result in a grade of S in this course. **Lecture, Credits 0 (Annual)**

IMGS-502**Imaging Science Senior Project I**

Part of this course is designed to develop skills in technical communication and scientific research practices. Each student is required to research, write, and present a proposal for an independent research project. Students initiate the research project defined in the proposal developed in the course. The project is supervised by a faculty member in imaging science and is expected to require 9-12 hours per week. (This course is restricted to students with at least 4th year standing in the IMGS-BS program.) **Research 3, Credits 3 (Fall, Spring, Summer)**

IMGS-503**Imaging Science Senior Project II**

Students perform the independent research project under the advising of a faculty member in imaging science. The research effort is expected to require 9-12 hours per week. The research outcomes are presented in written and oral form. (This course is restricted to students with at least 4th year standing in the IMGS-BS program.) **Research 3, Credits 3 (Fall, Spring, Summer)**

IMGS-513**Multi-Wavelength Astronomical Imaging**

This course surveys multi-wavelength astronomical observing techniques and instrumentation. Students will study the requirements, strengths, and limitations of telescopes, detectors, and instrumentation at major ground-based and space-based observatories spanning the electromagnetic spectrum from radio to X-rays; learn how these facilities function; and gain an understanding of how to process and analyze the data they generate. Examples of facilities to be scrutinized include the largest ground-based observatories (e.g., Keck, Gemini, and the VLT); radio interferometers (e.g., the Very Large Array and the Atacama Large (sub) Millimeter Array); optical/IR space telescopes (e.g., the Spitzer, Hubble, and James Webb Space Telescopes); and X-ray space telescopes (e.g., Chandra and XMM-Newton). Students will plan and carry out a project involving archival multi-wavelength imaging data on a topic of their choice. (Prerequisites: PHYS-213 or equivalent course. Students in the PHYS-BS program must also complete PHYS-275 prior to taking this course.) **Lecture 3, Credits 3 (Fall)**

IMGS-528**Design and Fabrication of Solid State Cameras**

The purpose of this course is to provide the student with hands-on experience in building a CCD camera. The course provides the basics of CCD operation including an overview, CCD clocking, analog output circuitry, cooling, and evaluation criteria. (Prerequisites: PHYS-111 or PHYS-211 or PHYS-207 or PHPS-106) **Lab 6, Credits 3 (Fall)**

IMGS-528**Design and Fabrication of Solid State Cameras**

The purpose of this course is to provide the student with hands-on experience in building a CCD camera. The course provides the basics of CCD operation including an overview, CCD clocking, analog output circuitry, cooling, and evaluation criteria. (Prerequisites: PHYS-111 or PHYS-211 or PHYS-207 or PHPS-106) **Lecture 1, Credits 3 (Fall)**

IMGS-532 Advanced Environmental Applications of Remote Sensing

This course will focus on a broader selection of analytical techniques with an application-centric presentation. These techniques include narrow-band indices, filtering in the spatial and frequency domains, principal component analysis, textural analysis, hybrid and object-oriented classifiers, change detection methods, and structural analysis. All of these techniques are applied to assessment of natural resources. Sensing modalities include imaging spectroscopy (hyperspectral), multispectral, and light detection and ranging (lidar) sensors. Applications such as vegetation stress assessment, foliar biochemistry, advanced image classification for land use purposes, detecting change between image scenes, and assessing topography and structure in forestry and grassland ecosystems (volume, biomass, biodiversity) and built environments will be examined. Real-world remote sensing and field data from international, US, and local sources are used throughout this course. (Prerequisites: IMGS-431 and (PHYS-112 or 1017-212 or 1017-212T or 1017-213 or PHYS-212) or equivalent courses.) **Lab 3, Credits 3 (Spring)**

IMGS-532 Advanced Environmental Applications of Remote Sensing

This course will focus on a broader selection of analytical techniques with an application-centric presentation. These techniques include narrow-band indices, filtering in the spatial and frequency domains, principal component analysis, textural analysis, hybrid and object-oriented classifiers, change detection methods, and structural analysis. All of these techniques are applied to assessment of natural resources. Sensing modalities include imaging spectroscopy (hyperspectral), multispectral, and light detection and ranging (lidar) sensors. Applications such as vegetation stress assessment, foliar biochemistry, advanced image classification for land use purposes, detecting change between image scenes, and assessing topography and structure in forestry and grassland ecosystems (volume, biomass, biodiversity) and built environments will be examined. Real-world remote sensing and field data from international, US, and local sources are used throughout this course. (Prerequisites: IMGS-431 and (PHYS-112 or 1017-212 or 1017-212T or 1017-213 or PHYS-212) or equivalent courses.) **Lecture 2, Credits 3 (Spring)**

IMGS-539 Principles of Solid State Imaging Arrays

This course covers the basics of solid state physics, electrical engineering, linear systems, and imaging needed to understand modern focal plane array design and use. The course emphasizes knowledge of the working of complementary metal-oxide-semiconductor (CMOS) and infrared arrays. (Prerequisites: PHYS-111 or PHYS-211 or PHYS-207 or PHPS-106) **Lecture 3, Credits 3 (Fall)**

IMGS-540 Remote Sensing Systems and Image Analysis

This course introduces the students to the governing equations for radiance reaching aerial or satellite based imaging systems. It then covers the temporal, geometric, spectral, and noise properties of these imaging systems with an emphasis on their use as quantitative scientific instruments. This is followed by a treatment of methods to invert the remotely sensed image data to measurements of the Earth's surface (e.g. reflectance and temperature) through various means of inverting the governing radiometric equation. The emphasis is on practical implementation of multidimensional image analysis and examining the processes governing spatial, spectral and radiometric image fidelity. (Prerequisite: IMGS-251 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

IMGS-542 Testing of Focal Plane Arrays

This course is an introduction to the techniques used for the testing of solid state imaging detectors such as CCDs (charge coupled device), CMOS, (complementary metal oxide semiconductor), and infrared arrays. Focal plane array users in industry, government and academia need to ensure that key operating parameters for such devices either fall within an operating range or that the limitation to the performance is understood. This is a hands-on course where the students will measure the performance parameters of a particular camera in detail. (Prerequisites: PHYS-111 or PHYS-211 or PHYS-207 or PHPS-106) **Lab 6, Credits 3 (Spring)**

IMGS-542 Testing of Focal Plane Arrays

This course is an introduction to the techniques used for the testing of solid state imaging detectors such as CCDs (charge coupled device), CMOS, (complementary metal oxide semiconductor), and infrared arrays. Focal plane array users in industry, government and academia need to ensure that key operating parameters for such devices either fall within an operating range or that the limitation to the performance is understood. This is a hands-on course where the students will measure the performance parameters of a particular camera in detail. (Prerequisites: PHYS-111 or PHYS-211 or PHYS-207 or PHPS-106) **Lecture 1, Credits 3 (Spring)**

**IMGS-589 Undergraduate Special Topics
Lec/Lab 3, Credits 1 - 3 (Fall, Spring, Summer)****IMGS-599 Imaging Science Independent Study**

This course is a faculty-directed tutorial of appropriate topics that are not part of the formal curriculum. The level of study is appropriate for student in any of their years of study. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**

Interdisciplinary Science**ITDS-099 Special Topics**

This is a lower-level course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lecture 1, Credits 0 (Fall or Spring)**

ITDS-150 Metacognitive Approaches to Scientific Inquiry

This course serves two purposes. One is to introduce students to metacognition, reflective practice and self-assessment. Students will explore how the continual assessment of one's own knowledge guides scientific progress in the development of both research and theoretical practice. The second is to apply metacognitive techniques to exploring scientific investigation from a combination of scientific, ethical and societal standpoints. Examples will be drawn from student interest, and may include topics such as: Chernobyl and Fukushima nuclear disasters, genetically modified organisms, indoor air quality, invasive species, forensic science. Metacognitive issues such as learning theory, stereotype threat and self-assessment will be explored for their role in the acquisition of scientific knowledge. **Lecture 3, Credits 3 (Fall)**

ITDS-160 Frontiers of Science I

Students will be introduced to the science knowledge underlying four areas of active scientific research on the RIT campus and give them skills in understanding, analyzing and explaining evidence, data, and results in those fields to provide a strong, rounded science background connected to exciting and up-to-date scientific work. Students develop a portfolio of work demonstrating their scientific literacy skills. **Lab 3, Credits 3 (Fall)**

ITDS-160 Frontiers of Science I

Students will be introduced to the science knowledge underlying four areas of active scientific research on the RIT campus and give them skills in understanding, analyzing and explaining evidence, data, and results in those fields to provide a strong, rounded science background connected to exciting and up-to-date scientific work. Students develop a portfolio of work demonstrating their scientific literacy skills. **Lecture 2, Credits 3 (Fall)**

ITDS-161 Frontiers of Science II

This course builds upon Frontiers of Science I, advancing the students into an in-depth exploration of research in science on campus. The course surveys the active science research areas through laboratory visits and complementary literature surveys. Students will subsequently develop a deeper understanding of a specific area of scientific research through the acquisition of related laboratory and/or online data. They will synthesize the information gleaned from their literature searches, laboratory visits and data in order to form and test a specific hypothesis. Students will learn to analyze the data in order to validate their hypothesis, will learn to communicate their understanding of the active research area, and will develop mixed-media presentations that interactively engage an audience in the topic. (Prerequisites: ITDS-160 or equivalent course.) **Lab 3, Credits 3 (Spring)**

ITDS-161 Frontiers of Science II

This course builds upon Frontiers of Science I, advancing the students into an in-depth exploration of research in science on campus. The course surveys the active science research areas through laboratory visits and complementary literature surveys. Students will subsequently develop a deeper understanding of a specific area of scientific research through the acquisition of related laboratory and/or online data. They will synthesize the information gleaned from their literature searches, laboratory visits and data in order to form and test a specific hypothesis. Students will learn to analyze the data in order to validate their hypothesis, will learn to communicate their understanding of the active research area, and will develop mixed-media presentations that interactively engage an audience in the topic. (Prerequisites: ITDS-160 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

ITDS-165 Machining of Scientific Apparatus

This shop course introduces safe machine practices. Students will also gain experience fabricating components for use in scientific apparatus. **Lab 3, Credits 1 (Fall, Summer)**

ITDS-189 Special Topics

This is an introductory course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. **Lec/Lab, Credits 1 - 3 (Fall, Spring)**

ITDS-280 Designing of Scientific Experiments

This course is an introduction to design and analysis of scientific research experiments. The course will present various types of experimental designs and include discussions of situations in which each is appropriate. In-class sessions will generally follow a group discussion format. This course is centered on a research experimental design experience. The student will bring or develop a research question, design an appropriate experiment, gather and analyze data, and prepare the results. The culminating event is a research 'conference' at which the students will present their findings. (Prerequisites: MATH-181 or MATH-251 or equivalent course.) **Lecture 3, Credits 3 (Int)**

ITDS-290**Introduction to Scientific Research**

This course will expose a student who is in the early stages of their post-secondary education to the process of conducting scientific research in an established university research laboratory setting. The student will perform experiments, document results, present their findings, and work closely with a faculty mentor who will design the research to be conducted. It is anticipated that this may be the student's first exposure to the field in which they are conducting research and the importance of background research and literature review will be emphasized. **Research, Credits 1 - 4 (Fall, Spring)**

ITDS-351H**Honors Science Seminar: Preparation for Advanced Study**

Students in this seminar will prepare to succeed in the next phase of their education — whether that means graduate school, a professional program, or other career options — by learning about the ways that culture and expectations change as one moves into settings of advanced training, and issues that sometimes arise as people make the transition. In-class discussions will focus on papers selected by the students and faculty, feedback from recent alumni, and experiences of RIT graduate students. The course will include oral presentations from students and faculty, as well as visiting speakers. Students will continue to develop their professional communication skills by preparing their own oral presentations and written assignments based on the course readings and independent research. (This course is restricted to students in the Honors program or students with at least a 3.3 cumulative GPA.) **Seminar 1, Credits 1 (Fall)**

ITDS-352H**Honors Science Seminar: Ethics in Science**

Ethical concerns are pervasive in all aspects of our society yet they are particularly meaningful in professional contexts wherein information can be falsified, stolen, modified or otherwise misrepresented. This course will address the issues that nascent scientists can expect to encounter in their careers. A foundation in ethical frameworks will be provided before students are given the opportunity to explore contemporary ethical issues in the sciences. Throughout the course students will examine current ethical issues in the sciences and share their experiences and insights with each other through oral presentations and classroom discussions. The conditional nature of ethical decisions will be a common thread intrinsic to all included topics along with those cultural and professional attributes that influence, inform and guide decision making. (This course is restricted to students in the Honors program or students with at least a 3.3 cumulative GPA.) **Seminar 1, Credits 1 (Spring)**

ITDS-353H**Honors Science Seminar: Separating Science from Pseudoscience**

This course addresses issues of evaluating, detecting, and communicating about pseudoscience that scientists are likely to encounter in their careers. For example, some people use scientific evidence to promote their view that Earth is a disc with the Arctic Circle in the center and a heavily-guarded 150-foot-tall wall of ice called Antarctica around the rim. However, more and better scientific evidence is available to suggest that the Earth is approximately spherical. How does one distinguish between pseudoscience (Flat Earth) and science (Approximately Spherical Earth), and how do we make cogent and persuasive arguments to skeptics of established scientific conclusions? (This course is restricted to students in the Honors program or students with at least a 3.3 cumulative GPA.) **Seminar 1, Credits 1 (Fall)**

ITDS-354H Honors Science Seminar: Data and Statistics: the Good, the Bad, and the Ugly

Mark Twain popularized the saying "There are three kinds of lies: lies, damned lies, and statistics." This course addresses the many ways that the seemingly objective processes of sample selection, data collection, analysis, and statistics can be subject to inadvertent or purposeful bias and have been used inappropriately to promote subjective (at best) and false (at worse) conclusions in the field of science. Students will explore topics in data collection, data science, and basic statistical inference with an eye toward spotting flimsy statistical arguments. (Prerequisites: STAT-145 or STAT-145H or MATH-252 or equivalent course. This course is restricted to students in the Honors program or students with at least a 3.3 cumulative GPA.) **Seminar 1, Credits 1 (Spring)**

ITDS-359**STEM Education: Research and Practice**

Research and practice introduces students to the research, theories, and applications of disciplinary-based education research (DBER). The course covers cognitive theories of learning (e.g. transfer and representational models) and their application to the disciplinary context. Classroom activities will include video examples of science learning environments, which students will analyze for level of engagement, analysis of a variety of conceptual and epistemological evaluations, and direct data analysis. Independent and/or group projects will allow for deeper study within the student's chosen discipline. **Lecture 2, Credits 2 (Fall, Spring)**

ITDS-370**Methods and Theory of Discipline-based Education Research**

This course is an introduction to major research themes, methodology, theories of learning, and research ethics relevant to discipline-based education research (DBER) in biology, chemistry, and physics. Research methods related to studying learning and development of expertise in science will include: the design of quantitative studies (surveys, assessments, and statistical analysis methods) and the design of qualitative studies (interviews, observations, coding). Relevant theories of learning will include cognitivist, developmental, and social/cultural perspectives. The course will use case studies from current literature on biology, chemistry, and physics education research to introduce these topics. Students will apply their understanding to develop and execute a semester-long research project in DBER. (Prerequisite: MATH-182 or PHYS-212 or PHYS-216 or CHMG-142 or CHEM-151 or BIOL-122 or BIOL-102 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

ITDS-389**Intermediate Special Topics**

This is an intermediate course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lec/Lab, Credits 1 - 3 (Fall, Spring, Summer)**

ITDS-450H**Honors Capstone Seminar**

This capstone seminar fulfills the final requirement for students in the honors program. Students will enroll in this course in their final year of study. The course uses a discussion format to help students wrestle with social and ethical issues associated with natural science, mathematics or data science in the modern world. Students will be challenged to reflect on their own role and responsibility as citizens. It culminates in a written report or project presentation. (This class is restricted to students in the Honors program and students with at least 4th year student standing.) **Lecture 1, Credits 1 (Fall, Spring)**

ITDS-489**Special Topics**

Lecture, Credits 1 - 3 (Fall, Spring, Summer)

Interdisciplinary Studies**INTS-151****Integrated Science I**

Consider how an organism moves through its environment: you may think about the biology of the organism, the physics behind moving appendages, the chemistry of muscle contractions, or mathematical models to describe the motion. Science is inherently integrated and interdisciplinary. This is the first semester interdisciplinary sciences course that highlights key, interdisciplinary topics that are taught in other courses, like biology, chemistry, physics, math, and statistics, and expands your working knowledge of the sciences. (Prerequisites: ASTP-660 or equivalent course. Co-requisites: PHYS-612 and ASTP-610 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

INTS-152**Integrated Science II**

Look at the current problems facing humanity: health, pollution, climate change, clean energy to name a few. None of these problems will be solved by a single person with mastery of a single STEM discipline. Solutions to these problems will be discovered by teams of researchers (biologists, chemists, physicists, mathematicians, and imaging scientists) working together. Science is inherently integrated and interdisciplinary. This is the second semester interdisciplinary sciences course that presents elements of biology, chemistry, mathematics, statistics, and physics in a practical, integrated, application-based context. (Prerequisites: INTS-151 and INTS-155 or equivalent course. This class is restricted to SCIEXP-UND students. Co-requisites: INTS-156 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

INTS-155**Integrated Science Lab I**

This is a project-based lab course spanning multiple topics and disciplines as students develop basic laboratory skills. This is the corresponding lab course for the first semester interdisciplinary science course that presents biology, chemistry, mathematics and statistics, and physics using themes that are tightly integrated with the co-requisite lecture course. The lab sessions will provide experiences that reflect real-world approaches to science in the 21st century. (Prerequisites: This class is restricted to SCIEXP-UND students. Co-requisites: INTS-151 or equivalent course.) **Lab 3, Credits 1 (Fall)**

INTS-156**Integrated Science Lab II**

Science is inherently integrated and interdisciplinary. This is the corresponding lab course for the first semester interdisciplinary science course that presents biology, chemistry, math, and physics using themes that are tightly integrated in the equivalent lecture courses. Students will work on projects that span multiple topics and disciplines as they develop basic laboratory skills. The lab sessions will provide experiences that reflect real-world approaches to science in the 21st century. (Prerequisites: INTS-151 and INTS-155 or equivalent course. This class is restricted to SCIEXP-UND students. Co-requisites: INTS-152 or equivalent course.) **Lab 3, Credits 1 (Spring)**

College of Science

INTS-295

Integrated Sciences Research

This course is a faculty-directed student project or research involving laboratory work, computer modeling, or theoretical calculations that could be considered of an original nature. The level of study is appropriate for students in their first three years of study. **Research, Credits 1 - 4 (Fall, Spring, Summer)**

INTS-298

Integrated Sciences Independent Study

This course is a faculty-directed exploration of appropriate multi-disciplinary topics that are not part of the formal curriculum. The level of study is appropriate for student in their first three years of study. **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**

INTS-495

Integrated Sciences Advanced Research

This course is a faculty-directed, advanced, student project or research involving laboratory work, computer modeling, or theoretical calculations that could be considered of an original nature. The level of study is appropriate for students in their final two years of study. **Research, Credits 1 - 4 (Fall, Spring, Summer)**

INTS-498

Integrated Sciences Advanced Independent Study

This course is a faculty-directed exploration of appropriate advanced multi-disciplinary topics that are not part of the formal curriculum. The level of study is appropriate for student in their final two years of study. **Ind Study, Credits 1 - 4 (Fall, Spring, Summer)**

Mathematics

MATH-090

Algebra

This course covers operations involving polynomials, algebraic fractions, factoring, exponents and radicals, solutions of linear and quadratic equations, and graphing linear equations. **Lecture 3, Credits 0 (Fall, Spring)**

MATH-101

College Algebra

This course provides the background for an introductory level, non-trigonometry based calculus course. The topics include a review of the fundamentals of algebra: solutions of linear, fractional, and quadratic equations, functions and their graphs, polynomial, exponential, logarithmic and rational functions, and systems of linear equations. (Prerequisites: Students may not take and receive credit for MATH-101 and MATH-111. See the Math department with any questions.) **Lecture 3, Credits 3 (Fall, Spring)**

MATH-104

Contemporary Mathematics

This course provides an exploration of assorted mathematical concepts by using a hands-on approach. Topics will be selected from a wide array of fields to show the presence and importance of mathematics in everyday life. **Lecture 3, Credits 3 (Spring)**

MATH-108

The Art of Geometry

This course introduces a rich variety of geometry topics beyond those studied at the high school level. Each topic is augmented with connections to the arts, sciences, engineering, and other everyday applications. Course activities will emphasize problem solving in geometry and communicating mathematical arguments in the context of geometry. Geometric concepts will be explored using technology as well. **Lecture 3, Credits 3 (Fall, Spring)**

MATH-111

Precalculus

This course provides the background for an introductory level, trigonometry-based calculus course. Topics include functions and their graphs, with an emphasis on functions that commonly appear in calculus including polynomials, rational functions, trigonometric functions, exponential functions, and logarithmic functions. The course also includes the analytic geometry of conic sections. One hour each week will be devoted to a collaborative learning workshop. (Prerequisites: Students may not take and receive credit for MATH-101 and MATH-111. See the Math department with any questions.) **Lecture 3, Credits 3 (Fall, Spring)**

MATH-111

Precalculus

This course provides the background for an introductory level, trigonometry-based calculus course. Topics include functions and their graphs, with an emphasis on functions that commonly appear in calculus including polynomials, rational functions, trigonometric functions, exponential functions, and logarithmic functions. The course also includes the analytic geometry of conic sections. One hour each week will be devoted to a collaborative learning workshop. (Prerequisites: Students may not take and receive credit for MATH-101 and MATH-111. See the Math department with any questions.) **Recitation 1, Credits 3 (Fall, Spring)**

MATH-131

Discrete Mathematics

This course is an introduction to the topics of discrete mathematics, including number systems, sets and logic, relations, combinatorial methods, graph theory, regular sets, vectors, and matrices. (Prerequisites: MATH-101, MATH-111, NMTH-260, NMTH-272 or NMTH-275 or a Math Placement Exam score of at least 35.) **Lecture 4, Credits 4 (Fall, Spring)**

MATH-151H Explorations of Place and Space: Connections and How they Determine Behavior

The course will explore the structure of networks and how it relates to the behavior of the people in the networks. Students will develop an understanding, through experimentation and investigation, of how the net result of many apparently independent qualities, events, or ideas is influenced by the network structure. Common and familiar phenomena, such as social networks and food webs, can be modeled as networks. The course will introduce students to the subject of graph theory (the branch of mathematics that studies networks). Students will examine real networks through the viewpoint of a mathematician, gaining an understanding of many seemingly unrelated concepts. The honors seminar integrates the required Year One curriculum. **Lecture 3, Credits 3 (Fall)**

MATH-161

Applied Calculus

This course is an introduction to the study of differential and integral calculus, including the study of functions and graphs, limits, continuity, the derivative, derivative formulas, applications of derivatives, the definite integral, the fundamental theorem of calculus, basic techniques of integral approximation, exponential and logarithmic functions, basic techniques of integration, an introduction to differential equations, and geometric series. Applications in business, management sciences, and life sciences will be included with an emphasis on manipulative skills. (Prerequisite: C- or better in MATH-101, MATH-111, MATH-131, NMTH-260, NMTH-272 or NMTH-275 or Math Placement Exam score greater than or equal to 45.) **Lecture 4, Credits 4 (Fall, Spring)**

MATH-171

Calculus A

This is the first course in a three-course sequence (COS-MATH-171, -172, -173). This course includes a study of precalculus, polynomial, rational, exponential, logarithmic and trigonometric functions, continuity, and differentiability. Limits of functions are used to study continuity and differentiability. The study of the derivative includes the definition, basic rules, and implicit differentiation. Applications of the derivative include optimization and related-rates problems. (Prerequisites: Completion of the math placement exam or C- or better in MATH-111 or C- or better in ((NMTH-260 or NMTH-272 or NMTH-275) and NMTH-220) or equivalent course.) **Lecture 5, Credits 3 (Fall, Spring)**

MATH-172

Calculus B

This is the second course in three-course sequence (COS-MATH-171, -172, -173). The course includes Riemann sums, the Fundamental Theorem of Calculus, techniques of integration, and applications of the definite integral. The techniques of integration include substitution and integration by parts. The applications of the definite integral include areas between curves, and the calculation of volume. (Prerequisites: C- or better in MATH-171 or 1016-171T or 1016-281 or 1016-231 or equivalent course.) **Lecture 5, Credits 3 (Fall, Spring)**

MATH-173

Calculus C

This is the third course in three-course sequence (COS-MATH-171, -172, -173). The course includes sequences, convergence and divergence of series, representations of functions by infinite series, curves defined by parametric equations, and polar coordinates. Also included are applications of calculus to curves expressed in parametric and polar form. (Prerequisites: C- or better in MATH-172 or equivalent course.) **Lecture 5, Credits 3 (Fall, Spring)**

MATH-180

Calculus Bridge

This course covers the topics in MATH-181 that are not covered in MATH-171, thereby preparing students to enter Project-Based Calculus II. This course meets for 15 days during the Tiger Term. This course does not constitute completion of a mathematics perspective in the RIT General Education Framework. **Lecture 1, Credits 1 (Int)**

MATH-181

Project-Based Calculus I

This is the first in a two-course sequence intended for students majoring in mathematics, science, or engineering. It emphasizes the understanding of concepts, and using them to solve physical problems. The course covers functions, limits, continuity, the derivative, rules of differentiation, applications of the derivative, Riemann sums, definite integrals, and indefinite integrals. (Prerequisite: A- or better in MATH-111 or A- or better in ((NMTH-260 or NMTH-272 or NMTH-275) and NMTH-220) or a math placement exam score greater than or equal to 70 or department permission to enroll in this class.) **Lecture 6, Credits 4 (Fall, Spring, Summer)**

MATH-181A

Calculus I

This is the first in a two-course sequence intended for students majoring in mathematics, science, or engineering. The course includes the same topics as MATH-181, but the focus of the workshop component is different. Whereas workshops attached to 181 emphasize concept development and real-world applications, the workshops of MATH-181A emphasize skill development and provide just-in-time review of precalculus material as needed. The course covers functions, limits, continuity, the derivative, rules of differentiation, applications of the derivative, Riemann sums, definite integrals, and indefinite integrals. (Prerequisite: B- or better in MATH-111 or B- or better in ((NMTH-260 or NMTH-272 or NMTH-275) and NMTH-220) or a math placement exam score greater than or equal to 60.) **Lecture 6, Credits 4 (Fall, Spring)**

MATH-182**Project-Based Calculus II**

This is the second in a two-course sequence intended for students majoring in mathematics, science, or engineering. It emphasizes the understanding of concepts, and using them to solve physical problems. The course covers techniques of integration including integration by parts, partial fractions, improper integrals, applications of integration, representing functions by infinite series, convergence and divergence of series, parametric curves, and polar coordinates. (Prerequisites: C- or better in (MATH-181 or MATH-173 or 1016-282) or (MATH-171 and MATH-180) or equivalent course(s).) **Lecture 6, Credits 4 (Fall, Spring, Summer)**

MATH-182A**Calculus II**

This is the second in a two-course sequence intended for students majoring in mathematics, science, or engineering. The course includes the same topics as MATH-182, but the focus of the workshop component is different. Whereas workshops attached to 182 emphasize concept development and real-world applications, the workshops of MATH-182A emphasize skill development and provide just-in-time review of precalculus material as needed. The course covers techniques of integration including integration by parts, partial fractions, improper integrals, applications of integration, representing functions by infinite series, convergence and divergence of series, parametric curves, and polar coordinates. (Prerequisites: C- or better in MATH-181A or equivalent course.) **Lecture 6, Credits 4 (Spring, Summer)**

MATH-185**Mathematics of Graphical Simulation I**

This is the first part of a two course sequence that aims at providing the mathematical tools needed to manipulate graphical objects and to model and simulate the physical properties of these objects. Topics from linear algebra, primarily in two and three dimensional space, analytic geometry, and calculus will be presented. The emphasis is on linear algebra, particularly its application to problems in geometry and graphical systems. (Prerequisites: MATH-101 or MATH-111 or MATH-131 or NMTH-260 or NMTH-272 or NMTH-275 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MATH-186**Mathematics of Graphical Simulation II**

This is the second part of a two-course sequence that aims at providing the mathematical tools needed to manipulate graphical objects and to model and simulate the physical properties of these objects. Topics from linear algebra, primarily in two and three dimensional space, analytic geometry, and calculus will be presented. The emphasis is on analytic geometry and calculus, as applied to geometric and physical simulations. (Prerequisites: MATH-185 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

MATH-189**Special Topics**

This is a course suitable for first-year students that covers topics not currently offered in the curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. **Lecture, Credits 1 - 3 (Fall, Spring, Summer)**

MATH-190**Discrete Mathematics for Computing**

This course introduces students to ideas and techniques from discrete mathematics that are widely used in Computer Science. Students will learn about the fundamentals of propositional and predicate calculus, set theory, relations, recursive structures and counting. This course will help increase students' mathematical sophistication and their ability to handle abstract problems. (Co-requisites: MATH-182 or MATH-182A or MATH-172 or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

MATH-199**Mathematics and Statistics Seminar**

This course introduces the programs within the School of Mathematical Sciences, and provides an introduction to math and statistics software. The course provides practice in technical writing. **Seminar 1, Credits 1 (Fall)**

MATH-200**Discrete Mathematics and Introduction to Proofs**

This course prepares students for professions that use mathematics in daily practice, and for mathematics courses beyond the introductory level where it is essential to communicate effectively in the language of mathematics. It covers various methods of mathematical proof, starting with basic techniques in propositional and predicate calculus and set theory, and then moving to applications in advanced mathematics. (Prerequisite: MATH-173 or MATH-182 or MATH-182A or equivalent course.) **Lecture 3, Credits 3 (Fall)**

MATH-200**Discrete Mathematics and Introduction to Proofs**

This course prepares students for professions that use mathematics in daily practice, and for mathematics courses beyond the introductory level where it is essential to communicate effectively in the language of mathematics. It covers various methods of mathematical proof, starting with basic techniques in propositional and predicate calculus and set theory, and then moving to applications in advanced mathematics. (Prerequisite: MATH-173 or MATH-182 or MATH-182A or equivalent course.) **Recitation 4, Credits 3 (Fall)**

MATH-211**Elements of Multivariable Calculus and Differential Equations**

This course includes an introduction to differential equations, Laplace transforms, numerical methods in differential equations, and the calculus of functions of two variables. The emphasis is on the application of these topics to problems in engineering technology. (Prerequisites: C- or better MATH-172 or MATH-182 or MATH 182A or 1016-232 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

MATH-219**Multivariable Calculus**

This course is principally a study of the calculus of functions of two or more variables, but also includes the study of vectors, vector-valued functions and their derivatives. The course covers limits, partial derivatives, multiple integrals, and includes applications in physics. Credit cannot be granted for both this course and MATH-221. (Prerequisite: C- or better MATH-173 or MATH-182 or MATH-182A or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

MATH-220**Vector Calculus**

This course introduces students to the concepts, techniques, and central theorems of vector calculus. It includes a study of line integrals, conservative vector fields, the flux of vector fields across curves and surfaces, Green's Theorem, the Divergence Theorem, and Stokes' Theorem. Credit may not be earned for this class if it is earned in COS-MATH-221. (Prerequisites: MATH-219 or equivalent course.) **Lecture 1, Credits 1 (Fall)**

MATH-221**Multivariable and Vector Calculus**

This course is principally a study of the calculus of functions of two or more variables, but also includes a study of vectors, vector-valued functions and their derivatives. The course covers limits, partial derivatives, multiple integrals, Stokes' Theorem, Green's Theorem, the Divergence Theorem, and applications in physics. Credit cannot be granted for both this course and MATH-219. (Prerequisite: C- or better MATH-173 or MATH-182 or MATH-182A or equivalent course.) **Lecture 4, Credits 4 (Fall, Spring, Summer)**

MATH-221H**Honors Multivariable and Vector Calculus**

This course is an honors version of MATH-221. It includes an introduction to vectors, surfaces, and multivariable functions. It covers limits, partial derivatives and differentiability, multiple integrals, Stokes' Theorem, Green's Theorem, the Divergence Theorem, and applications. Unlike MATH-221, students in this course will often be expected to learn elementary skills and concepts from their text so that in-class discussion can focus primarily on extending techniques, interpreting results, and exploring mathematical topics in greater depth; homework exercises and projects given in this class will require greater synthesis of concepts and skills, on average, than those in MATH-221. Students earning credit for this course cannot earn credit for MATH-219 or MATH-221. (Prerequisite: C- or better MATH-173 or MATH-182 or MATH-182A or equivalent course.) **Lecture 4, Credits 4 (Fall)**

MATH-231**Differential Equations**

This course is an introduction to the study of ordinary differential equations and their applications. Topics include solutions to first order equations and linear second order equations, method of undetermined coefficients, variation of parameters, linear independence and the Wronskian, vibrating systems, and Laplace transforms. (Prerequisite: MATH-173 or MATH-182 or MATH-182A or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

MATH-233**Linear Systems and Differential Equations**

This is an introductory course in linear algebra and ordinary differential equations in which a scientific computing package is used to clarify mathematical concepts, visualize problems, and work with large systems. The course covers matrix algebra, the basic notions and techniques of ordinary differential equations with constant coefficients, and the physical situation in which they arise. (Prerequisites: MATH-172 or MATH-182 or MATH-182A and students in CHEM-BS or CHEM-BS/MS or ISEE-BS programs.) **Lecture 4, Credits 4 (Spring)**

MATH-241**Linear Algebra**

This course is an introduction to the basic concepts of linear algebra, and techniques of matrix manipulation. Topics include linear transformations, Gaussian elimination, matrix arithmetic, determinants, vector spaces, linear independence, basis, null space, row space, and column space of a matrix, eigenvalues, eigenvectors, change of basis, similarity and diagonalization. Various applications are studied throughout the course. (Prerequisites: MATH-190 or MATH-200 or MATH-219 or MATH-220 or MATH-221 or MATH-221H or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

MATH-241H

Honors Linear Algebra

This honors course introduces the basic concepts and techniques of linear algebra. Concepts are addressed at a higher level than the standard course in linear algebra, and the topic list is somewhat broader. Topics include linear independence and span, linear functions, solving systems of linear equations using Gaussian elimination, the arithmetic and algebra of matrices, basic properties and interpretation of determinants, vector spaces, the fundamental subspaces of a linear function, eigenvalues and eigenvectors, change of basis, similarity and diagonalization. Students will learn to communicate explanations of mathematical facts and techniques by participating in a collaborative workshop format, and will learn to use MATLAB to solve matrix equations. (Prerequisites: MATH-219 or MATH-221 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MATH-251

Probability and Statistics

This course introduces sample spaces and events, axioms of probability, counting techniques, conditional probability and independence, distributions of discrete and continuous random variables, joint distributions (discrete and continuous), the central limit theorem, descriptive statistics, interval estimation, and applications of probability and statistics to real-world problems. A statistical package such as Minitab or R is used for data analysis and statistical applications. (Prerequisites: MATH-173 or MATH-182 or MATH 182A or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

MATH-255

Actuarial Mathematics

This course provides challenging problems in probability whose solutions require a combination of skills that one acquires in a typical mathematical statistics curriculum. Course work synthesizes basic, essential problem-solving ideas and techniques as they apply to actuarial mathematics and the first actuarial exam. (Prerequisites: MATH-251 or 1016-345 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MATH-261

Topics in the Mathematics of Finance

This course examines concepts in finance from a mathematical viewpoint. It includes topics such as the Black-Scholes model, financial derivatives, the binomial model, and an introduction to stochastic calculus. Although the course is mathematical in nature, only a background in calculus (including Taylor series) and basic probability is assumed; other mathematical concepts and numerical methods are introduced as needed. (Prerequisites: (MATH-219 or MATH-221 or MATH-221H) and (STAT-145 or STAT-145H or MATH-251) or equivalent courses.) **Lecture 3, Credits 3**

MATH-289

Special Topics

This is an course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lec/Lab, Credits 1 - 3**

MATH-291

History of Mathematics

This course is an introduction to the history of mathematics that covers some of the major developments in the history of mathematics, their historical background, and the people who made them. It provides the opportunity to study and to write about these topics. The topics will include Pythagoras, Newton and Leibniz, and Cantor. (Prerequisite: MATH-181 or equivalent course.) **Lecture 3, Credits 3**

MATH-295

Topics in Mathematical Problem Solving

This course develops strategies for solving problems that are chosen from a wide variety of areas in mathematics. Students present solutions to the class or instructor. (Prerequisite: MATH-173 or MATH-182 or MATH-182A or equivalent course.) **Lecture 3, Credits 3 (Fall)**

MATH-301

Mathematics of Simulation

This course is an introduction to computer simulation, simulation languages, model building and computer implementation, mathematical analyses of simulation models and their results using techniques from probability and statistics. (Prerequisites: STAT-257 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MATH-305

Introduction to Mathematical Computing

This course is an introduction to the use and application of scientific computing packages to explore methodologies (graphical, numerical and symbolic) to study problems arising in undergraduate courses in science, engineering and mathematics. Specific applications include numerical differentiation and integration, numerical optimization, initial value problems, linear systems of equations, and data fitting. (Prerequisites: (MATH-219 or MATH-221 or MATH-221H) and (MATH-241 or MATH-241H) and CSCI-141 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

MATH-311

Linear Optimization

This course presents the general linear programming problem. Topics include a review of pertinent matrix theory, convex sets and systems of linear inequalities, the simplex method of solution, artificial bases, duality, parametric programming, and applications. (Prerequisites: MATH-241 or MATH-241H or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MATH-312

Nonlinear Optimization

This course provides a study of the theory of optimization of non-linear functions of several variables with or without constraints. Applications of this theory in business, management, engineering and the sciences are considered. Algorithms for practical applications will be analyzed and implemented. The course may require the use of specialized software to analyze problems. Students taking this course will be expected to complete applied projects and/or case studies. (Prerequisites: (MATH-219 or MATH-221 or MATH-221H) and MATH-311 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MATH-321

Classical Game Theory

Classical game theory models conflict and cooperation between rational decision-making agents with hidden parameters. Topics include matrix games, Nash equilibria, the minimax theorem, prisoner's dilemma, and cooperative games. Applications can include adaptive or statistical decision theory, artificial intelligence (online learning, multi-agent systems), biology (evolutionary games, signaling behavior, fighting behavior), economics and business (auctions, bankruptcy, bargaining, pricing, two-sided markets), philosophy (ethics, morality, social norms), and political science (apportionment, elections, military strategy, stability of government, voting). (Prerequisites: MATH-241 or MATH-241H or equivalent course.) **Lecture 3, Credits 3 (Fall)**

MATH-322

Combinatorial Game Theory

Combinatorial games are two-player games with perfect information and no randomness or element of chance (such as Go, Chess, and Checkers). The course covers basic techniques of game theory, outcome classes, sums of games, the algebra of games, and top-down induction. Analyses will emphasize no-draw games terminating in a finite number of moves such as Nim, Domineering, Hackenbush, Chomp, and Amazons. (Prerequisites: MATH-190 or MATH-200 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

MATH-326

Boundary Value Problems

This course provides an introduction to boundary value problems. Topics include Fourier series, separation of variables, Laplace's equation, the heat equation, and the wave equation in Cartesian and polar coordinate systems. (Prerequisites: (MATH-231 or MATH-233) and (MATH-219 or MATH-221) or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

MATH-331

Dynamical Systems

The course revisits the equations of spring-mass system, RLC circuits, and pendulum systems in order to view and interpret the phase space representations of these dynamical systems. The course begins with linear systems followed by a study of the stability analysis of nonlinear systems. Matrix techniques are introduced to study higher order systems. The Lorentz equation will be studied to introduce the concept of chaotic solutions. (Prerequisites: (MATH-231 and (MATH-241 or MATH-241H)) or MATH-233 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

MATH-341

Advanced Linear Algebra

This is a second course in linear algebra that provides an in-depth study of fundamental concepts of the subject. It focuses largely on the effect that a choice of basis has on our understanding of and ability to solve problems with linear operators. Topics include linear transformations, similarity, inner products and orthogonality, QR factorization, singular value decomposition, and the Spectral Theorem. The course includes both computational techniques and the further development of mathematical reasoning skills. (Prerequisites: MATH-241 or MATH-241H or equivalent course.) **Lecture 3, Credits 3 (Spring, Summer)**

MATH-351

Graph Theory

This course covers the theory of graphs and networks for both directed and undirected graphs. Topics include graph isomorphism, Eulerian and Hamiltonian graphs, matching, covers, connectivity, coloring, and planarity. There is an emphasis on applications to real world problems and on graph algorithms such as those for spanning trees, shortest paths, and network flows. (Prerequisites: MATH-190 or MATH-200 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

MATH-361

Combinatorics

This course introduces the mathematical theory of enumeration of discrete structures. Topics include enumeration, combinatorial proofs, recursion, inclusion-exclusion, and generating functions. (Prerequisites: MATH-190 or MATH-200 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MATH-367

Codes and Ciphers

This course will introduce, explain and employ both the classical and modern basic techniques of cryptography. Topics will include the Vignère cipher, affine ciphers, Hill ciphers, one-time pad encryption, Enigma, public key encryption schemes (RSA, Diffie-Hellman, El-Gamal, elliptic curves), and hash functions. The course will include an introduction to algebraic structures and number theoretic tools used in cryptography. (Prerequisites: MATH-190 or MATH-200 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MATH-367H**Honors Codes and Ciphers**

The course introduces students to basic techniques of classical and modern cryptography, and learn about the significant impact of codes and ciphers on historical events. Topics will include the Vignère cipher, affine ciphers, Hill ciphers, one-time pad encryption, Enigma, public key encryption schemes (RSA, Diffie-Hellman, elliptic curves), and cryptographic hash functions. The course will include an introduction to algebraic structures and number theoretic tools used in cryptography. Students in this honors course will also study and explore historical source documents to get first-hand exposure to critical aspects of cryptanalysis from the early to mid-20th century. (Prerequisites: MATH-190 or MATH-200 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

MATH-371**Number Theory**

This course provides an introduction to the study of the set of integers and their algebraic properties. Topics include prime factorization and divisibility, linear Diophantine equations, congruences, arithmetic functions, primitive roots, and quadratic residues. (Prerequisites: MATH-190 or MATH-200 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MATH-381**Complex Variables**

This course covers the algebra of complex numbers, analytic functions, Cauchy-Riemann equations, complex integration, Cauchy's integral theorem and integral formulas, Taylor and Laurent series, residues, and the calculation of real-valued integrals by complex-variable methods. (Prerequisites: MATH-219 or MATH-221 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

MATH-389**Special Topics**

Special Topics courses focus on topics outside the current curriculum. They provide flexibility to address interests expressed by students, and offer instructors a proof-of-concept vehicle for additions to the current curriculum. (This course requires permission of the Instructor to enroll.) **Lec/Lab, Credits 1 - 3 (Fall, Spring, Summer)**

MATH-399**Mathematical Sciences Job Search Seminar**

This course helps students prepare to search for co-op or full-time employment. Students will learn strategies for conducting a successful job search and transitioning into the work world. The course meets one hour each week for five weeks. **Lecture 1, Credits 0 (Fall, Spring)**

MATH-411**Numerical Analysis**

This course covers numerical techniques for the solution of nonlinear equations, interpolation, differentiation, integration, and the solution of initial value problems. (Prerequisites: (MATH-231 and (MATH-241 or MATH-241H)) or MATH-233 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

MATH-412**Numerical Linear Algebra**

This course covers numerical techniques for the solution of systems of linear equations, eigenvalue problems, singular values and other decompositions, applications to least squares, boundary value problems, and additional topics at the discretion of the instructor. (Prerequisites: (MATH-220 or MATH-221 or MATH-221H or 1055-359 (Honors Multivariable Calculus)) and (MATH-231 and MATH-341) or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

MATH-421**Mathematical Modeling**

This course explores problem solving, formulation of the mathematical model from physical considerations, solution of the mathematical problem, testing the model and interpretation of results. Problems are selected from the physical sciences, engineering, and economics. (Prerequisites: (MATH-220 or MATH-221 or 1016-410 or 1016-328) and MATH-231 and (MATH-241 or MATH-241H) and MATH-251 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

MATH-431**Real Variables I**

This course is an investigation and extension of the theoretical aspects of elementary calculus. Topics include mathematical induction, real numbers, sequences, functions, limits, and continuity. The workshop will focus on helping students develop skill in writing proofs. (Prerequisites: (MATH-190 or MATH-200 or 1055-265) and (MATH-220 or MATH-221 or MATH-221H or 1016-410 or 1016-328) or equivalent courses.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

MATH-432**Real Variables II**

This course is a continuation of MATH-431. It concentrates on differentiation, integration (Riemann and Riemann-Stieltjes integrals), power series, and sequences and series of functions. (Prerequisites: MATH-431 or equivalent course) **Lecture 3, Credits 3 (Spring)**

MATH-441**Abstract Algebra I**

This course covers basic set theory, number theory, groups, subgroups, cyclic and permutation groups, Lagrange and Sylow theorems, quotient groups, and isomorphism theorems. Group Theory finds applications in other scientific disciplines like physics and chemistry. (Prerequisites: (MATH-190 or MATH-200 or 1055-265) and (MATH-241 or MATH-241H) or equivalent courses.) **Lec/Lab 4, Credits 3 (Fall, Spring)**

MATH-442**Abstract Algebra II**

This course covers the basic theory of rings, integral domains, ideals, modules, and abstract vector spaces. It also covers the key constructions including direct sums, direct products, and field extensions. These topics serve as the foundation of mathematics behind advanced topics such as algebraic geometry and various applications like cryptography and coding theory. (Prerequisites: MATH-441 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MATH-461**Topology**

This course defines metric spaces and topological spaces. For metric spaces it examines continuity spaces of continuous functions and completeness in Euclidean spaces. For topological spaces it examines compactness, continuous functions, and separation axioms. (Prerequisites: MATH-432 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MATH-489**Advanced Special Topics**

This is an advanced course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. **Lec/Lab, Credits 1 - 3 (Fall, Spring, Summer)**

MATH-495**Undergraduate Research in Mathematical Sciences**

This course is a faculty-directed project that could be considered original in nature. The level of work is appropriate for students in their final two years of undergraduate study. **Research, Credits 1 - 3 (Fall, Spring, Summer)**

MATH-498**Independent Study in Mathematical Sciences**

This course is a faculty-guided investigation into appropriate topics that are not part of the curriculum. **Ind Study, Credits 1 - 3 (Fall, Spring, Summer)**

MATH-499**Mathematics Co-op**

This course is a cooperative education experience for undergraduate students majoring in Applied Mathematics, Computational Mathematics or Statistics. **CO OP, Credits 0 (Fall, Spring, Summer)**

MATH-500**Senior Capstone in Mathematics**

This capstone experience introduces students to mathematical problems and situations not encountered in previous courses of study. The class will primarily revolve around student-directed, collaborative efforts to solve a given problem using rigorous mathematical analysis and (as appropriate) computational methods. Significant work outside the classroom will be required of students. Students will write a formal report of their solution methods, and produce a poster for presentation at an end-of-term conference-style event. (Prerequisite: MATH-411 and MATH-421 and (MATH-431 or MATH-441) or equivalent course.) **Lecture 3, Credits 3 (Spring)**

MATH-501**Experiential Learning Requirement in Mathematics**

The experiential learning requirement in the Applied Mathematics and Computational Mathematics programs can be accomplished in various ways. This course exists to record the completion of experiential learning activities that have been pre-approved by the School of Mathematical Sciences. Such pre-approval is considered on a case-by-case basis. **Lecture, Credits 0 (Fall, Spring, Summer)**

MATH-505**Stochastic Processes**

This course explores Poisson processes and Markov chains with an emphasis on applications. Extensive use is made of conditional probability and conditional expectation. Further topics, such as renewal processes, Brownian motion, queuing models and reliability are discussed as time allows. (Prerequisites: (MATH-241 or MATH-241H) and MATH-251 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

MATH-589**Advanced Special Topics**

Special Topics courses cover content that is not represented in the main curriculum on an experimental or trial basis. **Lecture 3, Credits 1 - 4 (Fall, Spring, Summer)**

Physics

PHYS-104

Stars and Galaxies

This course provides an introduction to the basic concepts of stellar astronomy including the celestial sphere, constellations, nomenclature, physical properties of stars, principles of spectroscopy as applied to astronomy, double stars, variable stars, star clusters, stellar evolution, gaseous nebulae, stellar motions and distribution, the Milky Way system, external galaxies, and cosmology. **Lecture 2, Credits 2 (Spring)**

PHYS-105

Stars and Galaxies Lab

This laboratory course includes experiments and exercises that relate to the principles and theories discussed in COS-PHYS-104 Stellar Astronomy. Observational exercises utilizing the RIT observatory and associated equipment will be emphasized. (Co-requisites: PHYS-104 or equivalent course.) **Lab 2, Credits 1 (Spring)**

PHYS-106

Solar System Astronomy

This course provides an introduction to basic concepts of solar system astronomy including celestial sphere, zodiac, astronomical telescopes, sun, moon, eclipses, earth as planet, planets and their satellites, comets, meteors, and theories of the origin of the solar system. **Lecture 2, Credits 2 (Fall)**

PHYS-107

Solar System Astronomy Lab

This laboratory course includes experiments related to the principles and theories discussed in the corresponding lecture course Solar System Astronomy PHYS-106. Observational exercises utilizing the RIT observatory and associated equipment will be emphasized. (Co-requisites: PHYS-106 or equivalent course.) **Lab 2, Credits 1 (Fall)**

PHYS-111

College Physics I

This is an introductory course in algebra-based physics focusing on mechanics and waves. Topics include kinematics, planar motion, Newton's laws, gravitation; rotational kinematics and dynamics; work and energy; momentum and impulse; conservation laws; simple harmonic motion; waves; data presentation/analysis and error propagation. The course is taught using both traditional lectures and a workshop format that integrates material traditionally found in separate lecture, recitation, and laboratory settings. **Lab 4, Credits 4 (Fall, Spring, Summer)**

PHYS-111

College Physics I

This is an introductory course in algebra-based physics focusing on mechanics and waves. Topics include kinematics, planar motion, Newton's laws, gravitation; rotational kinematics and dynamics; work and energy; momentum and impulse; conservation laws; simple harmonic motion; waves; data presentation/analysis and error propagation. The course is taught using both traditional lectures and a workshop format that integrates material traditionally found in separate lecture, recitation, and laboratory settings. **Lecture 2, Credits 4 (Fall, Spring, Summer)**

PHYS-112

College Physics II

This course is an introduction to algebra-based physics focusing on thermodynamics, electricity and magnetism, optics, and elementary topics in modern physics. Topics include heat and temperature, laws of thermodynamics, fluids, electric and magnetic forces and fields, DC electrical circuits, electromagnetic induction, optics, the concept of the photon, and the Bohr model of the atom. The course is taught using both traditional lectures and a workshop format that integrates material traditionally found in separate lecture, recitation, and laboratory settings. (Prerequisites: PHYS-111 or 1017-211 or equivalent course.) **Lab 4, Credits 4 (Fall, Spring)**

PHYS-112

College Physics II

This course is an introduction to algebra-based physics focusing on thermodynamics, electricity and magnetism, optics, and elementary topics in modern physics. Topics include heat and temperature, laws of thermodynamics, fluids, electric and magnetic forces and fields, DC electrical circuits, electromagnetic induction, optics, the concept of the photon, and the Bohr model of the atom. The course is taught using both traditional lectures and a workshop format that integrates material traditionally found in separate lecture, recitation, and laboratory settings. (Prerequisites: PHYS-111 or 1017-211 or equivalent course.) **Lecture 2, Credits 4 (Fall, Spring)**

PHYS-150

Introduction to Special Relativity

In this course students will learn aspects of Einstein's Theory of Special Relativity including time dilation, length contraction, Lorentz transformations, velocity transformations, relativistic Doppler effect, issues with simultaneity, and relativistic expressions for energy and momentum. **Lecture 3, Credits 3 (Fall)**

PHYS-189

Introductory Special Topics

This is an introductory course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (Enrollment in this course requires permission from the department offering the course.) **Lecture, Credits 1 - 4**

PHYS-205

Principles of Optics

This course is an introduction to physical and geometrical optics. Topics will include: wave and photon description of light; propagation of electromagnetic waves in vacuum and transparent media; mirrors, lenses, and simple optical instruments; basics of optical fibers; polarization of light and polarizing optical elements; interference; Michelson interferometer; Fraunhofer and Fresnel diffraction; diffraction gratings. (Prerequisites: PHYS-112 or 1017-213 and (1017-212 or 1017-212T) or equivalent courses.) **Lecture 4, Credits 3 (Fall)**

PHYS-207

University Physics I: AP-C Waves

This course is without exception only for students who have earned credit for PHYS-206. This is a course in calculus-based physics for science and engineering majors. Topics include mechanical oscillations and waves, and data presentation/analysis. The course is taught in a workshop format that integrates the material traditionally found in separate lecture and laboratory courses. This course together with PHYS-206 is equivalent to PHYS-211. (Prerequisites: PHYS-206 and (MATH-181 or MATH-181A or MATH-172) or equivalent courses. Co-requisite: MATH-182 or MATH-182A or MATH-172 or equivalent course.) **Lab 2.5, Credits 1 (Fall, Spring)**

PHYS-209

University Physics II: AP-C Optics

This course is without exception only for students who have earned credit for PHYS-208. Topics include geometrical and physical optics. The course is taught in a lecture/workshop format that integrates the material traditionally found in separate lecture and laboratory courses. This course together with PHYS-208 is equivalent to PHYS-212. (Prerequisites: (PHYS-211 or PHYS-211A or PHYS-206 or PHYS-216) and PHYS-208 and (MATH-181 or MATH-181A) or equivalent courses. Co-requisite: MATH-182 or MATH-182A or MATH-172 or equivalent course.) **Lab 2.5, Credits 1 (Fall, Spring)**

PHYS-211

University Physics I

This is a course in calculus-based physics for science and engineering majors. Topics include kinematics, planar motion, Newton's Laws, gravitation, work and energy, momentum and impulse, conservation laws, systems of particles, rotational motion, static equilibrium, mechanical oscillations and waves, and data presentation/analysis. The course is taught in a workshop format that integrates the material traditionally found in separate lecture and laboratory courses. (Prerequisites: C- or better in MATH-181 or equivalent course. Co-requisites: MATH-182 or equivalent course.) **Lec/Lab 6, Credits 4 (Fall, Spring)**

PHYS-211A

University Physics IA

This is a course in calculus-based physics for science and engineering majors whose performance on the Math Placement Exam resulted in their placement in MATH-181A. Topics include kinematics, planar motion, Newton's Laws, gravitation, work and energy, momentum and impulse, conservation laws, systems of particles, rotational motion, static equilibrium, mechanical oscillations and waves, and data presentation/analysis. The course is taught in a workshop format that integrates the material traditionally found in separate lecture and laboratory courses. (Prerequisites: C- or better in MATH-181 or MATH-181A or MATH-172 or equivalent course. Co-requisites: MATH-182 or MATH-182A or MATH-172 or equivalent course.) **Lec/Lab 7.5, Credits 4 (Fall, Spring)**

PHYS-211B

University Physics I Bridge Workshop

This is a 3-week intensive workshop specifically aimed at strengthening the competencies of students who previously received a grade of D in University Physics I or IA in the immediately preceding semester. Topics include kinematics, planar motion, Newton's Laws, gravitation, work and energy, momentum and impulse, conservation laws, systems of particles, rotational motion, static equilibrium, mechanical oscillations and waves, and data presentation/analysis. The intent is not to provide an accelerated re-delivery of University Physics I or IA. This course focuses on typical difficulties encountered by students in an interactive setting and provides the opportunity for the students to demonstrate improved competencies in the subject matter. There will also be some laboratory experiences that must be successfully completed. A significant effort outside the classroom is also expected. (Prerequisites: Earned grade of "D" in PHYS-211 or PHYS-211A in the previous term.) **Lab 12, Credits 0 (Int)**

PHYS-212

University Physics II

This course is a continuation of PHYS-211, University Physics I. Topics include electrostatics, Gauss' law, electric field and potential, capacitance, resistance, DC circuits, magnetic field, Ampere's law, inductance, and geometrical and physical optics. The course is taught in a lecture/workshop format that integrates the material traditionally found in separate lecture and laboratory courses. (Prerequisites: (PHYS-211 or PHYS-211A or PHYS-206 or PHYS-216) or (MECE-102, MECE-103 and MECE-205) and (MATH-182 or MATH-172 or MATH-182A) or equivalent courses. Grades of C- or better are required in all prerequisite courses.) **Lec/Lab 6, Credits 4 (Fall, Spring)**

PHYS-213

Modern Physics I

This course provides an introductory survey of elementary quantum physics, as well as basic relativistic dynamics. Topics include the photon, wave-particle duality, deBroglie waves, the Bohr model of the atom, the Schrodinger equation and wave mechanics, quantum description of the hydrogen atom, electron spin, and multi-electron atoms. (Prerequisites: PHYS-209 or PHYS-212 or PHYS-217 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

PHYS-214**Modern Physics II**

This course is a continuation of a survey of modern physics beyond the topics introduced in Modern Physics I. Central topics include the physics of multi-electron atoms, molecular structure, fundamentals of statistical physics applied to systems of particles, elementary solid-state physics, applications to semiconductor materials and simple devices, and basic elements of nuclear physics. (Prerequisites: PHYS-213 or equivalent course. Students in the PHYS-BS program must also complete PHYS-275 prior to taking this course.) **Lecture 3, Credits 3 (Fall)**

PHYS-216**University Physics I: Physics Majors**

This is a course in calculus-based physics for physics majors. Topics include kinematics, planar motion, Newton's Laws, gravitation, work and energy, momentum and impulse, conservation laws, systems of particles, rotational motion, static equilibrium, mechanical oscillations and waves, and data presentation/analysis. Calculus and basic numerical techniques will be applied throughout the course to analyze non-idealized complex systems. The course is taught in a workshop format that integrates the material traditionally found in separate lecture and laboratory courses. The course will also include enrichment activities connecting current developments in the field of physics. (Prerequisites: C- or better in MATH-181 or MATH-181A or MATH-172 or equivalent course. Co-requisites: MATH-182 or MATH-182A or MATH-172 or equivalent course.) **Lec/Lab 7.5, Credits 4 (Fall, Spring)**

PHYS-217**University Physics II: Physics Majors**

This course is a continuation of PHYS-216, University Physics I: Physics Majors. Topics include fluids, thermodynamics, electrostatics, Gauss' law, electric field and potential, capacitance, resistance, circuits, magnetic field, Ampere's law, inductance, and geometrical and physical optics. Calculus and basic numerical techniques will be applied throughout the course to analyze non-idealized complex systems. The course is taught in a lecture/workshop format that integrates the material traditionally found in separate lecture and laboratory courses. The course will also include enrichment activities connecting current developments in the field of physics. (Prerequisites: Grades of C- or better in (MATH-182 or MATH-182A) and (PHYS-216 or PHYS-206) or equivalent courses.) **Lec/Lab 7.5, Credits 4 (Fall, Spring)**

PHYS-220**University Astronomy**

This course is an introduction to the basic concepts of astronomy and astrophysics for scientists and engineers. Topics include the celestial sphere, celestial mechanics, methods of data acquisition, planetary systems, stars and stellar systems, cosmology, and life in the universe. (Prerequisites: PHYS-211 or PHYS-211A or PHYS-207 or PHYS-216 or (MECE-102 and MECE-103 and MECE-205) or equivalent courses.) **Lecture 3, Credits 3 (Fall, Spring)**

PHYS-222**Electronic Measurements**

This course covers the fundamentals of AC and DC circuit theory, electrical analysis of simple linear networks, operations of and circuits containing diodes and transistors, linear and non-linear operation of op-amps and their applications, and analysis of basic digital circuits. Laboratory classes reinforce lecture material and teach practical skills in use of basic test and measurement equipment. (Prerequisites: PHYS-212 or PHYS-209 or PHYS-217 or equivalent course.) **Lab 3, Credits 3 (Spring)**

PHYS-222**Electronic Measurements**

This course covers the fundamentals of AC and DC circuit theory, electrical analysis of simple linear networks, operations of and circuits containing diodes and transistors, linear and non-linear operation of op-amps and their applications, and analysis of basic digital circuits. Laboratory classes reinforce lecture material and teach practical skills in use of basic test and measurement equipment. (Prerequisites: PHYS-212 or PHYS-209 or PHYS-217 or equivalent course.) **Lecture 2, Credits 3 (Spring)**

PHYS-225**Introduction to Computational Physics and Programming**

This course introduces methods for using computers to model the behavior of physical systems. Students will learn how computers represent numbers, limits of computation, how to write computer programs, and to use good programming practices. Students will also apply numerical methods of differentiation and integration, and numerical solutions to differential equations in physical situations. (Prerequisites: (PHYS-211 or PHYS-211A or PHYS-207 or PHYS-216) and (MATH-182 or MATH-182A or MATH-173) or equivalent courses. Co-requisite: PHYS-212) **Lab 4, Credits 3 (Fall)**

PHYS-225**Introduction to Computational Physics and Programming**

This course introduces methods for using computers to model the behavior of physical systems. Students will learn how computers represent numbers, limits of computation, how to write computer programs, and to use good programming practices. Students will also apply numerical methods of differentiation and integration, and numerical solutions to differential equations in physical situations. (Prerequisites: (PHYS-211 or PHYS-211A or PHYS-207 or PHYS-216) and (MATH-182 or MATH-182A or MATH-173) or equivalent courses. Co-requisite: PHYS-212) **Lecture 1, Credits 3 (Fall)**

PHYS-251**Principles and Applications of Quantum Technology**

This course will provide an introduction to principles of quantum mechanics, hardware platforms, and applications of quantum technology. Two state systems, such as photon polarization, will be used to introduce mathematical formalism including Dirac notation for quantum states, operators, observables, measurements, composite systems and entanglement. The course will overview different platforms for physically realizing quantum bits (qubits) and operations on quantum bits. Real-world effects on quantum systems, including coherence and decoherence and reducing classical noise in quantum hardware will be discussed. Quantum limits on precision of sensors and imaging as well quantum simulations will be primary applications. (Prerequisites: (PHYS-111 or PHYS-211 or PHYS-211A or PHYS-216) and (MATH-172 or MATH-182 or MATH-182A) or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

PHYS-275**Sophomore Physics Seminar**

This seminar will assist students in their preparation for the Physics Comprehensive Oral Exam (CORE) required at the end of the course by presenting a unified as opposed to topical approach to physics. Physics majors must pass this course before going on to 300-level Physics courses. (Prerequisites: PHYS-212 or PHYS-208 or PHYS-209 or PHYS-217 or equivalent course. Co-requisites: PHYS-213 or equivalent course.) **Lecture 2, Credits 1 (Fall, Spring)**

PHYS-283**Vibrations and Waves**

This course is an introduction to the physics of vibrations and waves, beginning with the simple harmonic oscillator, the foundation to understanding oscillatory and vibratory systems. The course will include driven and damped single oscillators, coupled discrete oscillators, and continuous vibrating systems. Connections will be made with many areas of physics that involve oscillation, including mechanics, electromagnetism, and quantum mechanics. (Prerequisites: PHYS-212 or PHYS-217 or PHYS-209 and (MATH-182 or MATH-182A or MATH-173) or equivalent courses. Co-requisites: MATH-231 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

PHYS-289**Intermediate Special Topics**

This is an intermediate course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (Enrollment in this course requires permission from the department offering the course.) **Lecture, Credits 1 - 4**

PHYS-295**Physics Research**

This course is a faculty-directed student project or research involving laboratory work, computer modeling, or theoretical calculations that could be considered of an original nature. The level of study is appropriate for students in their first three years of study. (Enrollment in this course requires permission from the department offering the course.) **Research, Credits 1 - 3 (Fall, Spring, Summer)**

PHYS-298**Physics Independent Study**

This course is a faculty-directed tutorial of appropriate topics that are not part of the formal curriculum. The level of study is appropriate for student in their first three years of study. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 3 (Fall, Spring, Summer)**

PHYS-315**Experiments in Modern Physics**

In this course, students perform experiments representative of the foundation of modern quantum physics. These include investigations of wave particle duality, and the earliest of quantum mechanical models as well as measurements of fundamental constants. Experiments typically include electron diffraction, the photoelectric effect, optical diffraction and interference, atomic spectroscopy, charge-to-mass ratio of an electron, and blackbody radiation. This class teaches basic instrumentation techniques as well as data reduction and analysis. Students are expected to keep a laboratory notebook and present results in a journal-style paper. (Prerequisites: PHYS-213 or equivalent course. Students in the PHYS-BS program must also complete PHYS-275 prior to taking this course.) **Lab 4, Credits 3 (Fall)**

PHYS-315**Experiments in Modern Physics**

In this course, students perform experiments representative of the foundation of modern quantum physics. These include investigations of wave particle duality, and the earliest of quantum mechanical models as well as measurements of fundamental constants. Experiments typically include electron diffraction, the photoelectric effect, optical diffraction and interference, atomic spectroscopy, charge-to-mass ratio of an electron, and blackbody radiation. This class teaches basic instrumentation techniques as well as data reduction and analysis. Students are expected to keep a laboratory notebook and present results in a journal-style paper. (Prerequisites: PHYS-213 or equivalent course. Students in the PHYS-BS program must also complete PHYS-275 prior to taking this course.) **Lecture 1, Credits 3 (Fall)**

PHYS-316 **Advanced Laboratory in Physics**
In this course, students perform advanced experiments representative of the foundation of modern quantum physics. Experiments typically explore properties of materials, semiconductors, atomic physics, and nuclear decay. This class continues the instruction in instrumentation techniques as well as data reduction and analysis that began in Experiments in Modern Physics, PHYS-315. Students are expected to keep a laboratory notebook and present results in a journal-style paper. (Prerequisites: PHYS-214 and PHYS-315 or equivalent courses. Students in the PHYS-BS program are also required to complete PHYS-275 prior to taking this course.) **Lab 4, Credits 3 (Spring)**

PHYS-316 **Advanced Laboratory in Physics**
In this course, students perform advanced experiments representative of the foundation of modern quantum physics. Experiments typically explore properties of materials, semiconductors, atomic physics, and nuclear decay. This class continues the instruction in instrumentation techniques as well as data reduction and analysis that began in Experiments in Modern Physics, PHYS-315. Students are expected to keep a laboratory notebook and present results in a journal-style paper. (Prerequisites: PHYS-214 and PHYS-315 or equivalent courses. Students in the PHYS-BS program are also required to complete PHYS-275 prior to taking this course.) **Lecture 1, Credits 3 (Spring)**

PHYS-320 **Mathematical Methods in Physics**
This course serves as an introduction to the mathematical tools needed to solve intermediate and upper-level physics problems. Topics include matrix algebra, vector calculus, Fourier analysis, partial differential equations in rectangular coordinates, and an introduction to series solutions of ordinary differential equations. (Prerequisites: (MATH-219 or MATH-221) and MATH-231 and (PHYS-209 or PHYS-212 or PHYS-217) or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

PHYS-321 **Advanced Mathematical Methods in Physics**
This course is a continuation of PHYS-320, serving to introduce additional mathematical tools needed to solve intermediate and upper-level physics problems. Topics include special functions, series solutions to ordinary differential equations, solutions to partial differential equations in curvilinear coordinate systems, matrix techniques, and the calculus of variations. (Prerequisites: PHYS-320 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

PHYS-330 **Classical Mechanics**
This course is a systematic presentation of Newtonian kinematics and dynamics including equations of motion in one- and three-dimensions, conservation laws, non-inertial reference frames, central forces, Lagrangian mechanics, and rigid body motion. This course will use advanced mathematical techniques including differential equations, vector calculus, and matrix and tensor formulations. (Prerequisites: (MATH-219 or MATH-221) and MATH-231 and (PHYS-209 or PHYS-212 or PHYS-217). Students in the PHYS-BS program are also required to complete PHYS-275 prior to taking this course. Co-requisites: PHYS-320 or equivalent course.) **Lecture 4, Credits 4 (Fall)**

PHYS-352 **Introduction to Biological Physics**
How does physics bear on the workings of living cells and organisms? Physicists are critically needed to participate in addressing grand challenges in biology and medicine today. These challenges call for scientists, including physicists, to thoroughly penetrate the molecular workings of cells, tissues, and organisms and to create new and better instruments to probe them. This course is designed to acquaint you with current scientific challenges posed by this universe within, to equip you with physics tools that are important for addressing them, and to acquaint you with basic physical principles central to quantitative study of living cells and organisms. The course includes an introductory tour of cell biology from a physics standpoint, a quantitative introduction to molecular forces in living cells, and an introduction to manifestations of statistical physics in living organisms. Applications include enzyme catalysis, oxygen transport, diffusion within cells, thermodynamic forces, motor proteins, spontaneous structure formation, cell signaling, the electrical double layer, and conduction of nerve impulses. Additional topics will be chosen according to interests of students and instructors. (Prerequisites: PHYS-212 or PHYS-209 or PHYS-217 or equivalent course.) **Lecture 3, Credits 3 (Biannual)**

PHYS-360 **Introduction to Chaotic Dynamics**
This course introduces basic tools for visualizing the behavior of nonlinear systems. In particular, the students are required to use the computer as an exploratory tool for generating and observing transitions between periodic behavior and chaotic behavior. Most of the course focuses on the driven, damped pendulum as a model dynamical system, but the ideas are readily extended to other systems as well. (Prerequisites: PHYS-283 and (PHYS-330 or 1017-402) or equivalent courses. Students in the PHYS-BS program are also required to complete PHYS-275 prior to taking this course.) **Lecture 3, Credits 3 (Spring)**

PHYS-365 **Physical Optics**
In this course light waves having both amplitude and phase will be described to provide a foundation for understanding key optical phenomena such as interference, diffraction, and propagation. Starting from Maxwell's equations the course advances to the topic of Fourier optics. (Prerequisites: (PHYS-212 or PHYS-209 or PHYS-217) and PHYS-225, PHYS-283, PHYS-320 and (MATH-219 or MATH-221 or MATH-221H) or equivalent courses. Students in the PHYS-BS program are also required to complete PHYS-275 before taking this course.) **Lecture 2, Credits 3 (Spring)**

PHYS-365 **Physical Optics**
In this course light waves having both amplitude and phase will be described to provide a foundation for understanding key optical phenomena such as interference, diffraction, and propagation. Starting from Maxwell's equations the course advances to the topic of Fourier optics. (Prerequisites: (PHYS-212 or PHYS-209 or PHYS-217) and PHYS-225, PHYS-283, PHYS-320 and (MATH-219 or MATH-221 or MATH-221H) or equivalent courses. Students in the PHYS-BS program are also required to complete PHYS-275 before taking this course.) **Lab 3, Credits 3 (Spring)**

PHYS-370 **Stellar Astrophysics**
This course presents concepts of stars and stellar systems at an intermediate level. Topics include the observed characteristics of stars, stellar atmospheres, stellar structure and evolution, interaction of stars with the interstellar medium, and the populations of stars within the Milky Way Galaxy. (Prerequisites: PHYS-213 and PHYS-220 or equivalent courses. Students in the PHYS-BS program are also required to complete PHYS-275 prior to taking this course.) **Lecture 3, Credits 3**

PHYS-371 **Galactic Astrophysics**
This course describes the structure and dynamics of the Milky Way galaxy. It provides an overview of the major constituents of the Milky Way, their interactions, and the methods by which astronomers study them. (Prerequisites: PHYS-213 and PHYS-220 or equivalent courses. Students in the PHYS-BS program are also required to complete PHYS-275 prior to taking this course.) **Lecture 3, Credits 3 (Fall)**

PHYS-372 **Extragalactic Astrophysics and Cosmology**
This course provides a survey of the structure of the universe on the largest scales, including galaxies and clusters of galaxies. The course also provides an overview of the history of the universe from the Big Bang to the current day, and describes the observational evidence for our current values of the cosmological parameters. (Prerequisites: PHYS-213 and PHYS-220 or equivalent courses. Students in the PHYS-BS program are also required to complete PHYS-275 prior to taking this course.) **Lecture 3, Credits 3 (Fall)**

PHYS-373 **Observational Astronomy**
This course provides a practical, hands-on introduction to optical astronomy. Students will use the RIT Observatory's telescopes and CCD cameras to take images of celestial objects, reduce the data, and analyze the results. The course will emphasize the details of image processing required to remove instrumental effects from CCD images. (Prerequisites: PHYS-220 or equivalent course. Students in the PHYS-BS program are also required to complete PHYS-275 prior to taking this course.) **Lab 2, Credits 3 (Spring)**

PHYS-373 **Observational Astronomy**
This course provides a practical, hands-on introduction to optical astronomy. Students will use the RIT Observatory's telescopes and CCD cameras to take images of celestial objects, reduce the data, and analyze the results. The course will emphasize the details of image processing required to remove instrumental effects from CCD images. (Prerequisites: PHYS-220 or equivalent course. Students in the PHYS-BS program are also required to complete PHYS-275 prior to taking this course.) **Lecture 2, Credits 3 (Spring)**

PHYS-374 **Introduction to Astrophysics**
This seminar-style course presents concepts of stars, stellar systems and the universe at an intermediate level. Topics include the observed characteristics of stars, stellar atmospheres, stellar structure and evolution, classification and properties of galaxies, galaxy clusters, nuclei of galaxies, the early universe, cosmic expansion and cosmological parameters. (Prerequisites: PHYS-213 and PHYS-220 or equivalent courses.) **Lecture 1, Credits 1 (Fall)**

PHYS-377 **Advanced Computational Physics**
This course introduces students to advanced methods for using computers to model the behavior of physical systems. Topics will include numerical solutions to differential equations such as heat transfer, planetary motion, and shock waves, the Monte Carlo approach to problems with large domains, tradeoffs between efficiency and precision, minimization and maximization of functions, and the statistical modeling of data. (Prerequisites: PHYS-225 and PHYS-320 or equivalent courses. Students in the PHYS-BS program are also required to complete PHYS-275 prior to taking this course.) **Lab 3, Credits 3 (Spring)**

PHYS-377**Advanced Computational Physics**

This course introduces students to advanced methods for using computers to model the behavior of physical systems. Topics will include numerical solutions to differential equations such as heat transfer, planetary motion, and shock waves, the Monte Carlo approach to problems with large domains, tradeoffs between efficiency and precision, minimization and maximization of functions, and the statistical modeling of data. (Prerequisites: PHYS-225 and PHYS-320 or equivalent courses. Students in the PHYS-BS program are also required to complete PHYS-275 prior to taking this course.) **Lecture 2, Credits 3 (Spring)**

PHYS-389**Special Topics**

This is a course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lec/Lab, Credits 1 - 3 (Fall, Spring)**

PHYS-408**Laser Physics**

This course covers the semi-classical theory of the operation of a laser, characteristics and practical aspects of various laser systems, and some applications of lasers in scientific research. (Prerequisites: PHYS-365 or equivalent course. Students in the PHYS-BS program are also required to complete PHYS-275 prior to taking this course.) **Lecture 3, Credits 3 (Fall)**

PHYS-411**Electricity and Magnetism**

This course is a systematic treatment of electrostatics and magnetostatics, charges, currents, fields and potentials, dielectrics and magnetic materials, Maxwell's equations and electromagnetic waves. Mathematical formalism using differential and integral vector calculus is developed. Field theory is treated in terms of scalar and vector potentials. Special techniques for solution to Laplace's equation as a boundary value problem are covered. Wave solutions of Maxwell's equations, and the behavior of electromagnetic waves at interfaces, are discussed. (Prerequisites: PHYS-209 or PHYS-212 or PHYS-217) and PHYS-320 or equivalent courses. Students in PHYS-BS or PHYS-2M are also required to complete PHYS-275 prior to taking this course.) **Lecture 4, Credits 4 (Spring)**

PHYS-412**Advanced Electricity and Magnetism**

This course is an advanced treatment of electrodynamics including propagating waves, electromagnetic radiation, and relativistic electrodynamics. Field theory is treated in terms of scalar and vector potentials. Wave solutions of Maxwell's equations, the behavior of electromagnetic waves at interfaces, guided electromagnetic waves, and simple radiating systems will be covered. Relativistic electrodynamics will be introduced including field tensors and four vector notation. (Prerequisites: PHYS-411 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

PHYS-414**Quantum Mechanics**

This course is a study of the concepts and mathematical structure of non-relativistic quantum mechanics. Topics for the course include wave functions and the Schrodinger equation, solutions to the one-dimensional and three-dimensional time-independent Schrodinger equation, stationary states and their superposition to produce time-dependent states, quantum-mechanical operators, commutators, and uncertainty principles, solutions to general central potential problems and the hydrogen atom, and the quantum theory of angular momentum. (Prerequisites: PHYS-213, PHYS-320 and (PHYS-330 or 1017-402) or equivalent courses. Students in the PHYS-BS program are also required to complete PHYS-275 before taking this course.) **Lecture 3, Credits 3 (Fall)**

PHYS-415**Advanced Quantum Mechanics**

This course is a continued study of the concepts and mathematical structure of quantum mechanics presented in Quantum Mechanics (PHYS-414), with an emphasis on applications to real physical systems. Topics covered include the quantum theory of spin, effect of magnetic fields on spin-1/2 particles, many-particle systems, variational principle, time-independent and time-dependent perturbation theory, absorption and emission of radiation by atoms, quantum theory of scattering, and interpretations and paradoxes of quantum mechanics. (Prerequisites: PHYS-414 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

PHYS-424**Nuclear Physics**

This course is a study of the properties and structure of the atomic nucleus as determined by experiments and theory. Topics for the course include a description and quantum-mechanical treatment of radioactive decay, nuclear reactions, basic aspects of nuclear radiation detection, and selected applications of nuclear physics. (Prerequisites: PHYS-214 and PHYS-320 and PHYS-330 or equivalent courses. Students in the PHYS-BS program are also required to complete PHYS-275 prior to taking this course.) **Lecture 3, Credits 3 (Fall)**

PHYS-440**Thermal and Statistical Physics**

This course is an introduction to the principles of classical thermodynamics and its statistical basis, including: equations of state, the first and second laws of thermodynamics, microscopic basis of entropy, temperature and thermal equilibrium, thermodynamic potentials, applications of thermodynamics, kinetic theory of gases, and Boltzmann and quantum statistics. (Prerequisites: PHYS-213 and MATH-231 or equivalent courses. Students in the PHYS-BS program are also required to complete PHYS-275 prior to taking this course.) **Lecture 3, Credits 3 (Fall)**

PHYS-441**Advanced Thermal and Statistical Physics**

This course is a continued study of the concepts and mathematical structure of statistical physics presented in Thermal and Statistical Physics (PHYS-440). Topics covered include ensembles in statistical physics, weakly interacting gases, the Ising model of a ferromagnet, monatomic liquids, kinetic theory of transport processes, path integral and Boltzmann equation formulations of transport theory. (Prerequisites: PHYS-320 and PHYS-440 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

PHYS-450**Capstone Preparation**

This course is a preparation for the two-semester physics capstone project to be carried out in the following year. It includes selection of a project and faculty mentor, preparation of a feasibility study, preparation of a paper, and a public oral presentation. (Enrollment in this course requires permission from the department offering the course.) **Lecture 1, Credits 1 (Spring)**

PHYS-451**Capstone Project I**

In collaboration with faculty mentor(s), students will carry out the first phase of an experimental, theoretical, or computational physics research project, will prepare an interim paper, and will present a short talk on their progress to physics faculty and students. The projects are those planned during the capstone preparatory course taken during the prior Spring semester. (Prerequisites: PHYS-450 or equivalent course.) **Project 12, Credits 3 (Fall)**

PHYS-452**Capstone Project II**

In collaboration with faculty mentor(s), students will carry out the final phase of an experimental, theoretical, or computational physics research project, will prepare a written paper and present an oral report on their progress to physics faculty and students. The projects are those planned during the capstone preparatory course taken during the prior Spring semester and commenced during the prior Fall semester. (Prerequisites: PHYS-451 or equivalent course.) **Project 12, Credits 3 (Spring)**

PHYS-489**Advanced Special Topics**

This is an advanced course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (Enrollment in this course requires permission from the department offering the course.) **Lecture, Credits 1 - 4**

PHYS-493**Astrophysics Research**

This course is a faculty-directed student project or research involving observational or theoretical work in astrophysics that could be considered of an original nature. (Enrollment in this course requires permission from the department offering the course.) **Research, Credits 1 - 4 (Fall, Spring, Summer)**

PHYS-495**Advanced Physics Research**

This course is a faculty-directed student project or research involving laboratory work, computer modeling, or theoretical calculations that could be considered of an original nature. The level of study is appropriate for students in their final two years of study. (Enrollment in this course requires permission from the department offering the course.) **Research, Credits 1 - 3 (Fall, Spring, Summer)**

PHYS-498**Advanced Physics Independent Study**

This course is a faculty-directed tutorial of appropriate topics that are not part of the formal curriculum. The level of study is appropriate for student in their final two years of study. (Enrollment in this course requires permission from the department offering the course.) **Ind Study, Credits 1 - 3 (Fall, Spring, Summer)**

PHYS-499**Physics Co-op**

This course is a cooperative education experience for undergraduate physics students. **CO OP, Credits 0 (Fall, Spring, Summer)**

PHYS-532**Solid State Physics**

This course is an introduction to the physics of the solid state including crystal structure, x-ray diffraction by crystals, crystal binding, elastic waves and lattice vibrations, thermal properties, the free electron model of solids, and band theory and its applications. (Prerequisites: PHYS-214 and PHYS-320 or equivalent courses. Students in the PHYS-BS program are also required to complete PHYS-275 prior to taking this course.) **Lecture 3, Credits 3 (Fall)**

PHYS-589**Advanced Special Topics**

This is an advanced course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lec/Lab, Credits 1 - 3 (Fall, Spring)**

Statistics**STAT-145****Introduction to Statistics I**

This course introduces statistical methods of extracting meaning from data, and basic inferential statistics. Topics covered include data and data integrity, exploratory data analysis, data visualization, numeric summary measures, the normal distribution, sampling distributions, confidence intervals, and hypothesis testing. The emphasis of the course is on statistical thinking rather than computation. Statistical software is used. (Prerequisite: MATH-101 or MATH-111 or NMTH-260 or NMTH-272 or NMTH-275 or a math placement exam score of at least 35.) **Lecture 3, Credits 3 (Fall, Spring, Summer)**

STAT-145H**Honors Introduction to Statistics I**

This course provides an enriched learning environment for RIT Honors Students with a project-based, lab-oriented approach to learning statistics. Students will learn to formulate research problems in statistical terms, design a statistical model to study these problem, collect data, summarize data, draw inferences in the context of the applications, and present their analyses. Students learn the use of the statistical software package Minitab to aid in the analysis of data. Students will be expected to participate in class discussions. This course may not be taken for credit if credit is to be earned in COS-STAT-205. (Prerequisite: MATH-101 or MATH-111 or NMTH-260 or NMTH-272 or NMTH-275 or a math placement exam score of at least 35.) **Lecture 3, Credits 3 (Spring)**

STAT-146**Introduction to Statistics II**

This course is an elementary introduction to the topics of regression and analysis of variance. The statistical software package Minitab will be used to reinforce these techniques. The focus of this course is on business applications. This is a general introductory statistics course and is intended for a broad range of programs. (Prerequisites: STAT-145 or equivalent course.) **Lecture 6, Credits 4 (Fall, Spring, Summer)**

STAT-189**Special Topics**

A special topics course covers first-year content that is not represented in the formal curriculum, often on an experimental or trial basis. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lecture, Credits 1 - 3 (Fall, Spring, Summer)**

STAT-205**Applied Statistics**

This course covers basic statistical concepts and techniques including descriptive statistics, probability, inference, and quality control. The statistical package Minitab will be used to reinforce these techniques. The focus of this course is on statistical applications and quality improvement in engineering. This course is intended for engineering programs and has a calculus prerequisite. Note: This course may not be taken for credit if credit is to be earned in STAT-145 or STAT-155 or MATH 252.. (Prerequisite: MATH-173 or MATH-182 or MATH-182A or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

STAT-251**Probability and Statistics for Engineers I**

Statistics in engineering; enumerative and analytic studies; descriptive statistics and statistical control; sample spaces and events; axioms of probability; counting techniques; conditional probability and independence; distributions of discrete and continuous random variables; joint distributions; central limit theorem. (Prerequisite: MATH-173 or MATH-182 or MATH-182A or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

STAT-252**Probability and Statistics for Engineers II**

Point estimation; hypothesis testing and confidence intervals; one- and two-sample inference; introduction to analysis of variance, experimental design, and non-parametric methods. (Prerequisites: STAT-251 or MATH-251 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

STAT-257**Statistical Inference**

Learn how data furthers understanding of science and engineering. This course covers basic statistical concepts, sampling theory, hypothesis testing, confidence intervals, point estimation, and simple linear regression. A statistical software package such as MINITAB will be used for data analysis and statistical applications. (Prerequisites: MATH-251. NOTE: Students cannot receive credit for both MATH-252 and STAT-257 nor for both STAT-205 and STAT-257.) **Lecture 3, Credits 3 (Fall, Spring)**

STAT-289**Special Topics**

A special topics course covers content that is not represented in the formal curriculum, often on an experimental or trial basis. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lecture, Credits 1 - 3 (Fall, Spring, Summer)**

STAT-295**Statistical Analysis for Bioinformatics**

This course is an introduction to the probabilistic and statistical techniques used in computational molecular biology. Probabilistic and/or statistical techniques will be presented for the understanding of pairwise and multiple sequence alignment methods, gene and protein classification methods, and phylogenetic tree construction. (Prerequisites: MATH-173 or MATH-182 and MATH-190 or MATH-200 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

STAT-305**Regression Analysis**

This course covers regression techniques with applications to the type of problems encountered in real-world situations. It includes use of the statistical software SAS. Topics include a review of simple linear regression, residual analysis, multiple regression, matrix approach to regression, model selection procedures, and various other models as time permits. (Prerequisites: MATH-241 and MATH-252 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

STAT-325**Design of Experiments**

This course is a study of the design and analysis of experiments. It includes extensive use of statistical software. Topics include single-factor analysis of variance, multiple comparisons and model validation, multifactor factorial designs, fixed, random and mixed models, expected mean square calculations, confounding, randomized block designs, and other designs and topics as time permits. (Prerequisites: STAT-205 or MATH-252 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

STAT-335**Introduction to Time Series**

This course is a study of the modeling and forecasting of time series. Topics include ARMA and ARIMA models, autocorrelation function, partial autocorrelation function, detrending, residual analysis, graphical methods, and diagnostics. A statistical software package is used for data analysis. (Prerequisites: STAT-205 or MATH-252 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

STAT-345**Nonparametric Statistics**

This course is an in-depth study of inferential procedures that are valid under a wide range of shapes for the population distribution. Topics include tests based on the binomial distribution, contingency tables, statistical inferences based on ranks, runs tests and randomization methods. A statistical software package is used for data analysis. (Prerequisites: STAT-205 or MATH-252 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

STAT-405**Mathematical Statistics I**

This course provides a brief review of basic probability concepts and distribution theory. It covers mathematical properties of distributions needed for statistical inference. (Prerequisites: STAT-205 or MATH-252 or equivalent courses.) **Lecture 3, Credits 3 (Fall)**

STAT-406**Mathematical Statistics II**

This course is a continuation of STAT-405 covering classical and Bayesian methods in estimation theory, chi-square test, Neyman-Pearson lemma, mathematical justification of standard test procedures, sufficient statistics, and further topics in statistical inference. (Prerequisites: STAT-405 or equivalent course.) **Lecture 3, Credits 3 (Spring)**

STAT-415**Statistical Sampling**

This course provides a basis for understanding the selection of the appropriate tools and techniques for analyzing survey data. Topics include design of simple surveys, methods of data collection, a study of standard sampling methods. A statistical software package is used for data analysis. (Prerequisites: STAT-205 or MATH-252 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

STAT-425**Multivariate Analysis**

This course is a study of the multivariate normal distribution, statistical inference on multivariate data, multivariate analysis of covariance, canonical correlation, principal component analysis, and cluster analysis. A statistical software package such as Excel or SAS is used for data analysis. (Prerequisites: STAT-305 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

STAT-435**Statistical Linear Models**

This course is an introduction to the theory of linear models. Topics covered are least squares estimators and their properties, matrix formulation of linear regression theory, random vectors and random matrices, the normal distribution model and the Gauss-Markov theorem, variability and sums of squares, distribution theory, the general linear hypothesis test, confidence intervals, confidence regions, correlations among regressor variables, ANOVA models, geometric aspects of linear regression, and less than full rank models. (Prerequisites: STAT-305 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

STAT-495 Undergraduate Research in Statistical Science

This course is a faculty-directed project that could be considered original in nature. The level of work is appropriate for students in their final two years of undergraduate study. (This course requires permission of the Instructor to enroll.) **Research, Credits 1 - 3 (Fall, Spring, Summer)**

STAT-498 Independent Study in Statistical Science

This course is a faculty-guided investigation into appropriate topics that are not part of the curriculum. (This course requires permission of the Instructor to enroll.) **Ind Study, Credits 1 - 3 (Fall, Spring, Summer)**

STAT-500 Senior Capstone in Statistics

This course introduces the student to statistical situations not encountered in regular course of study. It integrates and synthesizes concepts in statistical theory with applications. Topics include open-ended analysis of data, current techniques and practice of statistics, development of statistical communication skills and the use of statistical software tools in data analysis. Each student is required to learn and use a statistical technique beyond what is covered in the previous courses. Students are expected to introduce the method in a presentation and to prepare a comprehensive, professional report detailing the statistical method and its application to a data set. (Corequisites: STAT-305 and STAT-325 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

STAT-501 Experiential Learning Requirement in Statistics

The experiential learning (EL) requirement may be fulfilled through a variety of methods including capstone, co-op, undergraduate research, summer research experiences, study abroad relevant to the major, designated EL courses, etc. All experiences must be approved by the School of Mathematical Sciences. Successful completion of the required elements will result in a grade of S in this course. **Lecture, Credits 0 (Fall, Spring, Summer)**

STAT-511 Statistical Software - R

This course is an introduction to the statistical-software package R, which is often used in professional practice. Some comparisons with other statistical-software packages will also be made. Topics include: data structures; reading and writing data; data manipulation, subsetting, reshaping, sorting, and merging; conditional execution and looping; built-in functions; creation of new functions; graphics; matrices and arrays; simulations and app development with Shiny. (Prerequisites: MATH-252 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

STAT-521 Statistical Quality Control

This course presents the probability models associated with control charts, control charts for continuous and discrete data, interpretation of control charts, and some standard sampling plans as applied to quality control. A statistical software package will be used for data analysis. (Prerequisites: MATH-252 or equivalent course.) **Lecture 3, Credits 3 (Fall, Spring)**

STAT-547 Data Mining

The use of statistical models in computer algorithms allows users to make decisions and predictions, and to perform tasks that traditionally require human cognitive abilities. Data mining and Machine learning are interdisciplinary fields at the intersection of statistics, computer science, applied mathematics which develops such statistical models and interweaves them with computer algorithms. It underpins many modern technologies, such as speech recognition, Internet search, bioinformatics and computer vision. The course will provide an introduction to Statistical Machine Learning and its core models and algorithms. (Prerequisites: STAT-305 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

STAT-572 Survey Design and Analysis

This course is an introduction to sample survey design with emphasis on practical aspects of survey methodology. Topics include: survey planning, sample design and selection, survey instrument design, data collection methods, and analysis and reporting. Application areas discussed will include program evaluation, opinion polling, customer satisfaction, product and service design, and evaluating marketing effectiveness. Data collection methods to be discussed will include face-to-face, mail, Internet and telephone. (Prerequisites: MATH-252 or equivalent course.) **Lecture 3, Credits 3 (Fall)**

STAT-584 Categorical Data Analysis

This course is intended to introduce students to categorical data analysis. Topics include: contingency tables, matched pair analysis, Fisher's exact test, logistic regression, analysis of odds ratios, log linear models, multi-categorical logit models, ordinal and paired response analysis. (Prerequisites: STAT-305 or equivalent courses.) **Lecture 3, Credits 3 (Spring)**

STAT-589 Advanced Special Topics

An advanced special topics course covers upper division content that is not represented in the formal curriculum, often on an experimental or trial basis. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (This course requires permission of the Instructor to enroll.) **Lecture, Credits 1 - 3 (Fall, Spring, Summer)**

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Course numbering: RIT courses are generally referred to by their alphanumeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100-299), upper division (300-599), or graduate level (600 and above).

Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.

Year One

YOPS-010 **RIT 365: RIT Connections**
RIT 365 students participate in experiential learning opportunities designed to launch them into their career at RIT, support them in making multiple and varied connections across the university, and immerse them in processes of competency development. Students will plan for and reflect on their first-year experiences, receive feedback, and develop a personal plan for future action in order to develop foundational self-awareness and recognize broad-based professional competencies. (This class is restricted to incoming 1st year or global campus students.) **Lecture 1, Credits 0 (Fall, Spring)**

Academic Support

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Course numbering: RIT courses are generally referred to by their alphanumeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100-299), upper division (300-599), or graduate level (600 and above).

Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.

Academic Support Center

ACSC-061

Applied Study Strategies

This lecture/lab course is designed for students interested in further developing and practicing their abilities in the areas of study skills and time management. Students enrolled in this course will gain a greater understanding of the learning process through guided practice and will be able to identify and use strategies that meet their preferred learning style. Students will practice and apply these strategies to their current credit courses to develop advanced proficiency as active learners. Additionally, students will receive support through individualized coaching sessions. (This course is open to all graduate and undergraduate students. Students in UTID AOS programs need to pass UWRT-100 with a C or better to enroll.) **Lec/Lab 2, Credits 0 (Fall, Spring)**

ACSC-062

Insights On Success

Insights on Success - This course is designed to provide students an opportunity to gain foundational insight into their own motivation, attitude and regulatory skills related to academic success and to increase their awareness of strategies to address academic challenges. Students will also explore time management and study strategies, how they are used, and why they are valuable. Additionally, students will receive support through individualized coaching sessions with the instructor. (This course is open to all graduate and undergraduate students. Students in UTID AOS programs need to pass UWRT-100 with a C or better to enroll.) **Lecture 2, Credits 0 (Fall, Spring)**

ACSC-063

Study Strategies Lab

This hands-on course is designed for students interested in maintaining their study strategies and organizational skills with regular support and feedback from an instructor. (Prerequisites: CRPG-61 or ACSC-62 or ACSC-61 or SLSA-60 or ACSC-64 or equivalent course.) **Lec/Lab 1, Credits 0 (Fall, Spring)**

ACSC-064

Essential Study Techniques

This course is designed for multiple start points of the semester and is geared toward students who, at mid-semester, are not being successful in their current credit courses due to study skills, time management, and/or academic organization. Students enrolled in this course will explore and practice essential study techniques and time management skills as they relate to the current credit courses in which students are enrolled. This course is not designed for students whose academic struggles are caused by attendance or participation challenges. (This course is open to all graduate and undergraduate students. Students in UTID AOS programs need to pass UWRT-100 with a C or better to enroll.) **Lecture 15, Credits 0 (Fall, Spring)**

ACSC-070

Critical Skills for Algebra

Critical Skills for Algebra is a course offered to enhance students' math skills before they begin their RIT credit math courses. This course will cover a variety of topics from basic algebra such as signed numbers, first degree and quadratic equations, polynomials, rational expressions, exponents, radicals, and functions. The specific topics will be based on the current math background and impending math needs of students enrolled in the course. A customized list of review topics, called a Study Plan, will be created based on the results of a Math Placement Exam or ASC Algebra Assessment Test, and/or series of quizzes taken by the students. Students will review topics that are identified in their Study Plan to improve their math background, as needed to meet the criteria for enrollment into a math course recommended by their department. Therefore, at the end of this course, students will take an algebra aptitude test. **Lecture, Credits 0 (Fall, Spring)**

ACSC-072

Critical Math Skills

A course offered to RIT students who wish to strengthen their math skills before registering for or while taking an RIT credit math course; class consists of a self-review or remediation of prerequisite math concepts in which a student may find themselves struggling. A customized list of review topics, called a Study Plan will be created based on an initial math assessment that focuses on basic Algebra, Trigonometry, Precalculus and introductory Calculus. An instructor is present to provide adequate support to enhance students' math study skills as well as deepen their understanding of math concepts. This course requires meeting with a Student Support Specialist in the Academic Support Center prior to enrollment. *Note: Please contact the ASC for additional details* **Lecture 2, Credits 0 (Fall, Spring, Summer)**

ACSC-073

Critical Skills for Intro to Stats

Critical Skills for Intro to Statistics is a course offered to develop and/or enhance students' math skills before they begin their RIT introductory statistics courses. This course will cover a variety of topics from basic algebra such as signed numbers, fractions, order of operations, first degree equations in one and two variables, linear functions. The specific topics will be based on the current math background and impending math needs of students enrolled in the course. A customized list of review topics, called a Study Plan, will be created based on the results of a Math Placement Exam or ASC Algebra Assessment Test, and/or series of quizzes taken by the students. Students will review topics that are identified in their Study Plan to improve their math background, as needed to meet the criteria for enrollment into a math course recommended by their department. Therefore, at the end of this course, students will take an algebra aptitude test. **Lecture 2, Credits 0 (Fall, Spring)**

ACSC-074

Critical Skills for Statistics

A course offered to students who need a review or remediation of specific statistics concepts; students who are struggling in RIT introductory statistics courses despite using RIT resources; students who have withdrawn from their current or past statistics course due to inadequate preparation, weak math background or lack of appropriate study skills; students who have received F, D or C in any of their previous introductory statistics courses; students who haven't taken statistics for a while and want to strengthen their statistics background before registering for RIT credit courses or before taking any required statistics exams for their graduate programs. This course may introduce variety of topics such as descriptive statistics, numerical measures, graphical representations of data, normal probability distribution, t-distribution, confidence intervals, hypothesis testing, basic statistical inferences, simple linear regression, multiple regression, regression analysis, and basic probability. The specific topics will be based on current statistics background and impending needs of students enrolled in the course. A customized list of review topics, called a Study Plan will be created based on the results of an initial assessment test and/or series of quizzes taken by the students. Students will review topics that are identified in their personalized Study Plan to improve their statistics background, as needed. **Lecture 30, Credits 0 (Fall, Spring)**

ACSC-078

Critical Skills for Trigonometry

Critical Trigonometry is a course offered to develop or enhance students' trigonometric skills before registering for an introductory calculus course. This course will cover a variety of topics from trigonometry such as measures of angles, trigonometric ratios, right triangle trigonometry, trigonometric functions, inverse trigonometric functions, trigonometry identities, formulas, and trigonometric equations. The specific topics will be based on the current trigonometric skills and impending math needs of students enrolled in the course. A customized list of review topics, called a Study Plan, will be created based on the results of an initial trigonometry assessment and/or series of quizzes taken by the students. Students will review topics that are identified in their Study Plan to develop or improve their trigonometric skills, as needed to meet the criteria for enrollment into a math course recommended by their department. Therefore, at the end of this course, students will take a trigonometry aptitude test. **Lecture, Credits 0 (Fall, Spring, Summer)**

ACSC-080

Core Physics Concepts

A course offered to RIT students who want to enhance understanding of physics concepts and their mathematical models, before registering for or while taking an RIT physics credit course. This course is designed to help students who want to: connect previously learned and newly encountered concepts; connect math techniques with recently encountered and previously learned physics concepts; connect textbook physics examples and problems in familiar and un-familiar contexts. This course is useful for students who have not taken physics for a while and want to strengthen their physics background before registering for RIT physics credit courses, and also for those more advanced in their physics course sequence who may not have had a satisfactory result in their physics course and want to review and retain as well as build new understanding. The specific topics of the course will be based on the current physics background and impending physics needs of students enrolled in the course. A customized list of review topics, called a Study Plan will be created based on the results of an initial inventory and/or series of evaluations taken by the students. Students will review topics that are identified in their personalized Study Plan to strengthen their physics concepts and review mathematical techniques, as needed. **Lecture 2, Credits 0 (Fall, Spring, Summer)**

Academic Support

ACSC-090

Pathways to Graduate School

This course will support students in their final year at RIT as it relates to their graduate school application(s). Students will engage in a reflective process that will support their academic and personal development. Additionally, it will assist students in identifying and applying for funding and developing the skills and strategies to excel in their graduate program. **Lecture 1, Credits 0 (Fall)**

English Language Center

ELCI-001

Basic Language Analysis and Accuracy

In this course, students apply basic principles of grammar and vocabulary to construct meaningfully interconnected sentences in controlled contexts. Students will acquire the basic skills necessary to prewrite, edit and produce cohesive, unified ideas in clear sentences. Students' expanding vocabulary base at this level will facilitate their study of the writing process, including prewriting, writing, revising and editing techniques. **Lecture 6, Credits 0 (Fall, Spring, Summer)**

ELCI-003

Basic Writing and Reading

In this course, students will acquire the reading and vocabulary skills necessary to comprehend a beginning level text. A focus on word study and specific reading strategies will be taught. Through interaction with other students and the text, students will receive opportunities to communicate orally and in writing regarding their readings in class. Homework and assessments will reinforce second language literacy skills. **Lecture 6, Credits 0 (Fall, Spring, Summer)**

ELCI-005

Basic Speaking and Listening

The aim of this course is to provide students with the language skills necessary to communicate effectively on concrete, familiar topics. Listening comprehension will focus on understanding explicitly stated information and speaking will focus on the expression of basic ideas. **Lecture 5, Credits 0 (Fall, Spring, Summer)**

ELCI-007

Basic Sounds and Spelling of English

The aim of this course is for students to learn how to identify and say American English sounds in spoken and printed communication. Students will develop listening skills to distinguish individual English sounds in words. Students will also learn the English alphabet to know how sounds are represented in English. Students will then apply this knowledge to producing sounds in words and structured conversation to be understandable to familiar listeners, and to interpret standard combinations of sounds into printed text. **Lecture 3, Credits 0 (Fall, Spring, Summer)**

ELCI-009

Basic English - Special Topics

This course is for the development of special topics for the basic level on an as needed basis. **Lecture 3, Credits 0 (Fall, Spring, Summer)**

ELCI-011

Beginner Language Analysis and Accuracy

In Beginner Writing and Language Analysis students increase their knowledge and control of basic grammatical structures in writing. This course focuses on the content, structure and organization of sentences and basic paragraphs. Students will practice and improve their skills in the writing process, including prewriting, writing, revision, and editing techniques. **Lecture 6, Credits 0 (Fall, Spring, Summer)**

ELCI-013

Beginner Writing and Reading

In this course, students will learn reading skills and also build word study and communication skills at the beginner level. Students interact with other students and with the text through various speaking and writing activities. Word study activities will support vocabulary development. **Lecture 6, Credits 0 (Fall, Spring, Summer)**

ELCI-015

Beginner Speaking and Listening

Through listening, students develop vocabulary and schema to discuss a variety of topics and familiar situations. Listening comprehension exercises focus on listening for salient information, drawing inferences and conclusions, and making connections between ideas. Speaking exercises focus on the ability to explain and elaborate concepts. **Lecture 5, Credits 0 (Fall, Spring, Summer)**

ELCI-017

Beginner Sounds and Spelling

This course introduces students to the concepts, questions, and methods that are used in inquiry-based learning. Basic language functions are integrated to complete practical, challenging projects and assignments that connect students to real-world audiences. Students are expected to take an active role in the learning process, both within and outside the classroom. **Lecture 3, Credits 0 (Fall, Spring, Summer)**

ELCI-019

Beginner English - Special Topics

This course is for the development of special topics for the beginner level on an as needed basis. **Lecture 3, Credits 0 (Fall, Spring, Summer)**

ELCI-021

Intermediate Writing and Reading

Intermediate Reading and Writing will help develop the reading skills and strategies needed for academic and general reading in English. Students will work on improving comprehension. Materials will include selections of various types and genres. This class will also focus on developing an academic style of writing in English. Students will write and revise a number of essays during this course and will also be evaluated on their ability to write clearly, cohesively, and meaningfully with adequate control of grammar and vocabulary. **Lecture 6, Credits 0 (Fall, Spring, Summer)**

ELCI-023

Intermediate Language Analysis and Accuracy

In Intermediate Language Analysis and Accuracy students increase their knowledge of grammatical structures and improve control of using those structures in speaking and writing. This course focuses on accuracy and meaningful use of grammatical structures in different contexts. **Lecture 6, Credits 0 (Fall, Spring, Summer)**

ELCI-025

Intermediate Speaking and Listening

Students will develop listening, discussion and note-taking skills to prepare for academic coursework, participate in small group discussions, and complete projects, both group and individual. Assignments include listening to recordings or other media and developing a discussion on a particular topic. **Lecture 5, Credits 0 (Fall, Spring, Summer)**

ELCI-027

Intermediate Inquiry-based Language Tasks

In this course, students continue to explore the process of inquiry as a means of discovery and learning. Students will examine current issues and topics created from textbook and RIT and Rochester community resources by completing short inquiry-based projects which draw together reading, speaking, listening and writing skills. **Lecture 3, Credits 0 (Fall, Spring, Summer)**

ELCI-029

Intermediate English - Special Topics

This course is for the development of special topics for the intermediate level on an as needed basis. **Lecture 3, Credits 0 (Fall, Spring, Summer)**

ELCI-031

High Intermediate Writing and Reading

High Intermediate Reading and Writing will improve students' reading fluency. Students will discuss texts in class, write journals as responses to the texts, summarize main ideas, and complete assignments based on the readings. Students will learn the elements of rhetorical styles and the steps of the writing process in order to produce clear, cohesive and meaningful writing. **Lecture 6, Credits 0 (Fall, Spring, Summer)**

ELCI-033

High Intermediate Language Analysis and Accuracy

In High Intermediate Language Analysis and Accuracy students increase their knowledge of advanced grammatical structures and improve control of using those structures in speaking and writing. This course focuses on accuracy and meaningful use of advanced grammatical structures in different contexts. **Lecture 6, Credits 0 (Fall, Spring, Summer)**

ELCI-035

High Intermediate Speaking and Listening

In this course, students acquire the listening, note-taking and discussion skills necessary for academic classwork. Students learn the conventions of academic discussion in order to question, analyze and respond to authentic listening material. Students learn to effectively present with a clear point of view, incorporating appropriate sources. **Lecture 5, Credits 0 (Fall, Spring, Summer)**

ELCI-037

High Intermediate Inquiry-based Language Tasks

In this course students examine the use of language necessary in completing projects such as simple experiments or cultural comparisons. Students transition from practicing basic self-expression through project work to beginning to use the conventional academic language to report on inquiry projects. **Lecture 3, Credits 0 (Fall, Spring, Summer)**

ELCI-039

High Intermediate English - Special Topics

This course is for the development of special topics for the high intermediate level on an as needed basis. **Lecture 3, Credits 0 (Fall, Spring, Summer)**

ELCI-080

Intensive English-Special Topics

This course is for the development of special topics for students in the ELCI program on an as needed basis. **Lecture 3, Credits 0 (Fall, Spring, Summer)**

ELCI-098

Intensive English-Orientation

The ELC Orientation Program accommodates new beginner and intermediate level ELC international students by providing them with basic information about immigration laws, academic expectations of university classes and academic workload, health and safety, campus resources, and living and studying at RIT in Rochester, NY. Students will practice language skills for cultural and academic situations. **Lecture, Credits 0 (Fall, Spring, Summer)**

ELCI-099

Intensive English - Independent Study

This course is for students in the ELCI program who want to study specialized topics on an as needed basis. **Ind Study 2, Credits 0 (Fall, Spring, Summer)**

ELCI-501 ELC Full-Time Course
ELC Full-Time Course **Lecture 20, Credits 0 (Fall, Spring, Summer)**

English Language Center (Advanced)

ELCA-012 **Advanced Writing and Reading**
This advanced writing and reading course is designed for international students to develop, practice, and perfect their academic writing and reading skills at the college level. This course concentrates on the content, structure and organization of academic paragraphs and essays of different types, as well as on the language skills and reading strategies necessary for efficient processing of academic texts. **Lecture 6, Credits 0 (Fall, Spring, Summer)**

ELCA-014 **Advanced Language Analysis and Accuracy**
In Advanced Language Analysis and Accuracy students rehearse and perfect skills to apply complex grammatical structures effectively in various writing and speaking assignments on a college level. Emphasis is also placed on meta-cognitive skills needed to analyze and explain complex grammatical structures and usage. **Lec/Lab 5, Credits 0 (Fall, Spring, Summer)**

ELCA-016 **Advanced Speaking and Listening**
In this course, students develop their listening, note-taking and discussion skills needed for academic classwork. Students will also practice expressing their point of view with sufficient evidence and coherent development of ideas. Emphasis will be on effective presentation skills, including accuracy in spoken work. **Lec/Lab 6, Credits 0 (Fall, Spring, Summer)**

ELCA-018 **Advanced Inquiry-based Language Tasks**
This course explores the inquiry process in general as well as the utility of different methods for investigating various topics and issues. Students determine and analyze the various linguistic conventions needed in academic projects and tasks such as simple research or academic description. Students are expected to actively engage in their own learning. **Lecture 3, Credits 0 (Fall, Spring, Summer)**

ELCA-020 **Advanced English - Special Topics**
This course is for the development of special topics for the advanced level on an as needed basis. **Lecture 3, Credits 0 (Fall, Spring, Summer)**

ELCA-022 **Academic Writing and Reading**
Students will practice various techniques to improve their writing in preparation for academic work and to understand and process the academic readings encountered in RIT academic courses. Coursework will include reading and analyzing the structure of academic persuasive essays and articles and writing academic persuasive essays. **Lecture 6, Credits 0 (Fall, Spring, Summer)**

ELCA-024 **Academic Language Analysis and Accuracy**
Academic Language Analysis and Accuracy is designed for international students with an advanced level of English proficiency. The course presents a review of grammar topics and speaking/writing strategies to enhance students' grammar, speaking, writing, and meta-cognitive skills. The course prepares students for college level work in their academic classes. **Lec/Lab 5, Credits 0 (Fall, Spring, Summer)**

ELCA-026 **Academic Speaking and Listening**
In this course, students listen to lectures and idea-based discussions and compare and contrast arguments and recognize overall connections among ideas, including supporting details, anecdotes, and natural digressions. Students distinguish between speaker purposes such as eliciting debate or inquiry vs. argumentation or exposition. Students lead discussions and make presentations incorporating conceptual material and sources from listening and reading. **Lec/Lab 6, Credits 0 (Fall, Spring, Summer)**

ELCA-028 **Academic Inquiry-based Language Tasks**
This course deepens the uses the inquiry process to develop necessary language skills of critical thinking used in academic settings. Students will listen to and read academic selections and evaluate their assumptions and form their own points of view as they develop their speaking and writing skills in inquiry-based projects and tasks. **Lecture 3, Credits 0 (Fall, Spring, Summer)**

ELCA-030 **Academic English - Special Topics**
This course is for the development of special topics for the academic level on an as needed basis. **Lecture 3, Credits 0 (Fall, Spring, Summer)**

ELCA-032 **Advanced Academic Writing and Reading**
This course will prepare students for entry or continuation in their academic discipline. This course will emphasize useful reading strategies that form the basis of scholarly writing processes, a vital key to success in any academic program. Students will leave this course more proficient practiced, skilled, and critical in their writing. **Lecture 6, Credits 0 (Fall, Spring, Summer)**

ELCA-034 **Advanced Academic Language Analysis and Accuracy**
Advanced Academic Language Analysis and Accuracy is designed for international students with an advanced level of English proficiency. In order to improve effectiveness, power and flow of academic communication, students explore and analyze language style through integrated academic reading and writing tasks. **Lec/Lab 5, Credits 0 (Fall, Spring, Summer)**

ELCA-036 **Advanced Academic Speaking and Listening**
In this course, students learn the conventions of academic discussion. Students will be exposed to a variety of academic listening materials, including guest speakers, on-campus lectures and community events and will be assessed on their ability to comprehend, synthesize, and respond critically to the information provided. Students will also lead their own academic lectures in their areas of expertise. **Lec/Lab 6, Credits 0 (Fall, Spring, Summer)**

ELCA-038 **Advanced Academic Inquiry-based Language Tasks**
This course is designed to look more closely at the diverse methods of inquiry while refining international students' linguistic skills used for critical thinking, reading, speaking, and writing in an academic setting to solve problems of university life and the larger community. Students generate their own inquiry-based projects to form questions and learn how to articulate and discuss their methods and findings. **Lecture 3, Credits 0 (Fall, Spring, Summer)**

ELCA-040 **Advanced Academic English - Special Topics**
This course is for the development of special topics for the advanced academic level on an as needed basis. **Lecture 3, Credits 0 (Fall, Spring, Summer)**

ELCA-050 **Interactions**
Students develop communicative and sociocultural competence in both one-off and repeated conversational experiences. Students begin with guided conversations with a classroom conversation assistant in which communicative strategies and norms are practiced and then employ these skills in conversations with conversation partner volunteers. Students also select an engagement project or a research topic in which they are able to practice sustained and repeated interactive experiences surrounding an area of personal interest. **Lecture 3, Credits 0 (Fall, Spring, Summer)**

ELCA-060 **Grammar Writing and Speaking Workshop**
In this multi-level course, students will practice a variety of grammatical structures used in academic discourse (both spoken and written) for specific rhetorical purposes. Students will practice daily selected grammar structures such as different sentence structures, clauses, sentence starters, and phrasal verbs to achieve a desired communicative outcome in a variety of short, focused spoken and written tasks. Students will also receive feedback from the instructor and peers on their completed written and spoken assignments in order to edit and revise their work. **Lecture 3, Credits 0 (Fall, Spring, Summer)**

ELCA-062 **Introduction to Academic English**
In Introduction to Academic English, students increase their knowledge and control of grammatical structures in writing. This course focuses on the content, structure, and organization of sentences and paragraphs. Students will practice and improve their skills in the writing process, including prewriting, writing, revision, and editing techniques. **Lecture 4, Credits 0 (Fall, Spring)**

ELCA-080 **English for Academic Purposes-Special Topics**
This course is for the development of special topics for students in the ELCA program on an as needed basis. **Lecture 3, Credits 0 (Fall, Spring, Summer)**

ELCA-091 **Graduate Writing and Reading**
In this course, students examine the language used to understand and produce graduate-level writing. Students rehearse and apply linguistic and rhetorical strategies. Students will leave this course better prepared to address the variety of reading and writing assignments required in graduate programs. **Lecture 5, Credits 0 (Fall, Spring, Summer)**

ELCA-093 **Graduate Spoken Communication**
This course is designed for international graduate students to further practice developing communication skills in English in order to participate fully in academic discussions. **Lec/Lab 5, Credits 0 (Fall, Spring, Summer)**

ELCA-095 **Graduate Research Writing**
The purpose of the course is to lead students through the process of developing a research paper. Students read a variety of research papers to identify the common organizational patterns and rhetorical forms. The course is also a workshop in which the instructor works with individual students to plan, write and revise a research paper using appropriate formal academic language and citations of referenced material. **Lec/Lab 5, Credits 0 (Fall, Spring, Summer)**

Recreation and Wellness

ELCA-097 **Graduate Written and Spoken Communication**

This course prepares students for study at the graduate level. Students examine and practice the language used in research writing and presentations at the graduate level. Students study rhetorical conventions and moves as well as linguistic devices which realize these rhetorical purposes. Students conduct research in their field or area of interest and engage in discussion and comparative analysis of the conventions of writing across various fields. Students produce written literature reviews, summaries, data analyses and short analytical writing assignments to rehearse and apply linguistic and rhetorical strategies. Students participate in discussions of academic texts and presentations on their research. **Lecture 7, Credits 0 (Fall, Spring, Summer)**

ELCA-098 **Academic English-Orientation**

The ELC Orientation Program provides new ELC international students with linguistically advanced information about immigration laws, academic expectations of university classes and academic workload, health and safety, campus resources and living and studying at RIT in Rochester, NY. Students will analyze and discuss cultural and academic situations and their implications. **Lecture, Credits 0 (Fall, Spring, Summer)**

ELCA-099 **Academic English - Independent Study**

This course is for students in the ELCA program who want to study specialized topics on an as needed basis. **Ind Study 2, Credits 0 (Fall, Spring, Summer)**

Recreation and Wellness

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Course numbering: RIT courses are generally referred to by their alphanumeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100-299), upper division (300-599), or graduate level (600 and above).

Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.

Dance

WDAN-001

Ballet

Ballet is a form of dancing performed for theatre audiences. Like any other dance forms, ballet may tell a story, express a mood, or simply reflect the music. But a ballet dancer's technique (way of performing) and special skills differ greatly from those of other dancers. Ballet dancers perform many movements that are unnatural for the body, but when these movements are well executed, they look natural and beautiful. The beginner section is for students with 0-4 years of formal training. The intermediate/advanced section is for students with 5 or more years of formal training. Both sections will focus on the various ballet movements, from the very fundamental to more complex movements, poses and classical styles. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WDAN-002

Advanced Ballet

Advanced Ballet is for students with 5 or more years of formal training. This class will focus on the various ballet movements to solidify fundamental techniques to more complex poses and styles. Each week, choreography will be introduced that will incorporate classical, contemporary and modern styles to challenge, refine and enhance each dancer's skill level. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity 2, Credits 0 (Fall, Spring)

WDAN-003

Lyrical Dance

Lyrical dance is a fusion of ballet, jazz, and modern dance. The blend of these styles creates movement that is both fluid and expressive. Lyrical dance is emotional and tells a story through its movement, often interpreting music with lyrics. Combines classical dance techniques with natural, organic movement to create a style of dance that incorporates both technique and individual interpretation. Qualities of movement, connection to music, spatial awareness, and principles of dance technique will be taught. **A course fee is applied via SFS bill. Activity 2, Credits 0 (Fall, Spring)

WDAN-006

Ballroom Dance

This course is designed to introduce you to foundation figures in several different partner dances. Smooth Dances include Foxtrot, Waltz, and Tango. Ballroom Latin dances include Rumba, Cha cha, Samba & Swing. The Latin Dance Class will cover Salsa, Merengue, Bachata & Cha cha. Attention will be paid to understanding music, and how the movement fits the music, and lead and follow techniques. Major course objectives include: Body and self-awareness, how to mix well with the same and opposite sexes, boosting self confidence, developing natural body rhythms and improving posture and poise. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WDAN-007

Advanced Ballroom Dance

This advanced course is designed for students who have participated in formal ballroom training or have successfully completed the Beginner Ballroom class at RIT. Dances covered will be the Foxtrot, Waltz, Tango, Viennese Waltz, Quickstep, Rumba, Cha Cha, and Swing. The focus will be on understanding different rhythms, musicality, partner skills, footwork and presentation. The intent is to create a sense of student competency as an above average ballroom dancer. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity 2, Credits 0 (Fall, Spring)

WDAN-009

Latin Dance

This Latin dance class will introduce the salsa, merengue, bachata and cha cha. Focus will be on the learning and mastering each dance with a partner. Latin dance forms which have their origin in Latin American countries (Central and South America) are known as Latin dances. These dances are categorized into social and ballroom dances. The adjectives which best describe the different Latin dance types are expressive, passionate, suggestive and romantic. No previous dance experience required. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity 2, Credits 0 (Fall, Spring)

WDAN-012

Jazz Dance

This course provides students with a wide range dance vocabulary which is created from ballet, modern dance and ethnic traditions. The styles of Bob Fosse and the fall and rebound of Jose Limon are a basis for this jazz course. The course will focus on the basic, intermediate and some advanced movements of contemporary jazz dance to help enable students to experience successful and enjoyable jazz dancing. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WDAN-015

Country Line Dance

Covering the latest line dances, club, and studio couples dances, Country Line Dancing is designed for beginning to intermediate dancers. Traditional dances give depth and background to the various basic terminology and techniques. Becoming familiar with today's social sector, dance adds excitement to body coordination, improved memorization, gained confidence, partner skills, self-confidence and enhanced creativity. The Electric Slide, Chattanooga, Dr. CC, Earthquake and Bubba are line dances of distinction. Couples pursue the Cha-Cha, Two Step, Waltz and the Sugar Waltz (full of turns and spins). Beginning with music beats and basic dance choreography counting, students pursue understanding that lays the foundation to all. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WDAN-019

Musical Theatre Dance

Musical Theatre Dance is an exploration of musical theatre in a class setting. Students will study movement commonly found in music theatre as well as dance styles from various decades in history such as the 1920's. There will be an emphasis on presentation and relating to the audience. Students will learn how the audition process works and will be provided tools to build confidence for those potential opportunities. Students of all levels and experience are encouraged to enroll. ** Fee: A course fee applied via SFS bill. See Course Notes for fee information. ** Activity 2, Credits 0 (Fall, Spring)

WDAN-030

Hip Hop Advanced

Hip Hop dance refers to styles primarily danced to hip hop music or that have evolved as a part of the hip hop culture. Hip hop dances are often considered street dances because of how they were formed and are being practiced. This hip hop class offers intermediate to more advanced skills that will encourage students to use their bodies in ways that help to develop/execute different stylistic techniques. This class is intended for students with at least 2 yrs. of dance experience. This class is high-paced, challenging and allows students to emphasize their creative rhythmic talents. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity 2, Credits 0 (Fall, Spring)

WDAN-031

Hip Hop Dance

Hip Hop dance refers to styles primarily danced to hip hop music or that have evolved as a part of the hip hop culture. Hip hop dances are often considered street dances because of how they were formed and are being practiced. This hip hop class offers basic to more advanced skills that will encourage students to use their bodies in ways that help to develop/execute many different stylistic techniques. This class is high-paced and challenging and allows students to emphasize their creative rhythmic talents. As hip hop is a broad genre in dance studios the instructor has the freedom/room for personal interpretation thus allowing the class to be highly creative. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WDAN-033

Street Jazz

Street Dance Technique is exactly what the name implies, an artfully fierce fusion of dance styles into a singular yet evolving technique. The fundamentals learned here can be tailored and applied to any dance style. Street Jazz offers a fun, judgment free environment to learn and create new and interesting dance moves while vibin' to cutting edge tracks. Students will have the opportunity to influence both the predominant dance style of the each class and the music. Come explore the dancer within and possibly discover your own dance swagger! LEVITAS! **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WDAN-035

Dance Choreo and Performance

Will allow students to apply dance concepts (to develop body strength, agility, coordination, problem solving-skills, self-confidence, formation and staging along with choreography and appreciation of movement as an art form) in depth and allow for increased opportunity for skill development, creativity and understanding of dance concepts. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

Recreation and Wellness

WDAN-037

Irish Step

Often marked with a blur of flashing feet, Irish step dancing has emerged from the pubs of Ireland to the international stage. This course teaches the style of dance made famous by the shows Riverdance and Lord of the Dance. In addition to being introduced to the rich history of Irish dance, students will learn soft shoe, hard shoe and ceili (group) dances. Be prepared for a great cardiovascular workout. Irish dance requires endurance, coordination and strength. The first dances (reels, jigs and slip jigs) are taught in soft shoe. These dances begin to teach the fundamentals of Irish dance. As you progress, you will start to learn more complex soft shoe dances, and then move onto learning hard shoe dances (treble jigs and hornpipes). **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WDAN-042

Swing Dance

This course is an introduction of two American Swing dance styles: East Coast Swing and Lindy Hop. The format will include seven weeks of East Coast Swing and seven weeks of Lindy Hop. American Swing dance is best known for group dances and competitions. This course will introduce single basic and triple basic steps, the pretzel, tuck turns, free spins, swings out and in, Lindy circles, side by side Charleston, front to back Charleston and wring out the rag and pop. *Note: No previous dance experience necessary and no need to register with a partner. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring)**

WDAN-045

Argentine Tango

Tango Dancing will focus on dancing comfortably and expressively to traditional tango music in a social setting. Argentine Tango traditionally stresses improvisation over repetition of set patterns. Students will progress from simple walking exercises to an introduction to simple steps and figures that are idiomatic of Argentine tango. Once students are comfortable with basic figures and a connection to the music and their partner, we will progress to more complex sequences built up from the basics. We will emphasize the spontaneous discovery of these sequences as a creative response in the moment to the music and to our partners over the rote memorization of rigid choreography. Students will learn the art of dancing expressively while also respecting the boundaries of other dancers on the floor. Navigation - or floor craft - is an essential skill to master in order to enjoy dancing in a crowded room. Upon completion of the class, students will feel comfortable dancing at a tango social dance along side experienced tango dancers. *Note: This is a Co-Ed Class environment. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WDAN-048

Tap Dance

Rhythm, technique, and musicality are the three areas of tap dance emphasized in this course. Whether you are brand new to tap or have previous experience, this course challenges students of all levels. Each level will receive tap steps and variations appropriate for their level. Beginners will learn basic steps, shuffles, ball changes, flaps, Maxie Fords, buffalos, and turns. Intermediate and advanced technique include wings, pullbacks (pickups), more intricate footwork, directional changes, and challenging variations. Styles include soft shoe, waltz clog, swing tap, musical theater and urban. *Note: Tap shoes are required. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

Fitness

WFIT-001

Power Sculpt

This fitness course is designed to facilitate cardiovascular fitness as well as increase muscular strength, endurance and flexibility. All aerobics classes combine a balance of high and low impact moves that include a sequence of muscular strengthening and stretching exercises. In addition to the benefits of improved heart and lung function, students will have an opportunity to burn calories, increase muscular strength and endurance, and increase flexibility. Throughout the course students will be encouraged to work at individual paces, utilizing high or low impact moves where appropriate. Through instructor-led group movements, with the use of music, brief explanations of basic aerobic principles, definitions and guidelines for proper technique will be covered. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring, Summer)**

WFIT-018

Turbokick and Barre

This course will offer a TurboKick class one day and a Barre class the second day. TurboKick is a high intensity fitness routine that provides cardiovascular benefits by combining muscle strength and endurance using the kickboxing format without the gloves. Barre Fitness uses a combination of postures inspired by ballet, yoga and Pilates that focuses on isometric strength training combined with high reps of small range-of-motion movements. The ballet barre is used as a prop for balance and the correct biomechanics of movement to increase strength, flexibility, stamina and dynamic stability. No previous dance experience required for the barre portion of this course. **Fee: A course fee applied via SFS bill. See Course Notes for fee information.** **Activity 2, Credits 0 (Fall, Spring)**

WFIT-021

P90X

This athletic style class utilizes cardiovascular and strength training with sports drills and traditional calisthenics to increase aerobic capacity, balance, strength and agility. The format of this class is a combination of an upper body workout with explosive movements for strength and power, followed by a complex lower body workout with elite movements to assist in strength and agility and ending with an intense core routine. This class is for all fitness levels because all of the exercises have modifications. Each class has the same format: Warm Up, Cardio, Lower Strength, Upper Strength, Core and Cool Down. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring)**

WFIT-022

TurboKick

Want to burn 700 calories in a 50 minute class? If yes, Turbo kick is perfect for you. You will love the music which keeps the energy high and the calories burning. This is an ultra-effective workout that strengthens upper and lower body. If you are looking to tone and condition your whole body, this is the workout for you. It is also an intense ab workout since every punch comes from the core. This class is offered at over 2,000 fitness clubs in the United States. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring, Summer)**

WFIT-023

Power Cardio Kickboxing

This kickboxing class is a Tae-Bo style class which includes various punch and kick movements, sports conditioning drills and core conditioning. This intense, high energy program is designed to provide an excellent total body workout using a kickboxing format. Any fitness level can participate. *Note: Boxing gloves and bags are NOT utilized in this course. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring)**

WFIT-024

Insanity

You've seen the infomercials, you've heard about the workouts, now its time to try it! Insanity™ pushes you beyond what you thought was possible with a high intensity anaerobic interval class with both high and low impact modifications for ALL Fitness levels. Participants will experience MAX interval training with explosive cardio and plyometric drills in addition to intervals of strength, power, and resistance. Additional strength, ab and core training techniques will help you transform your body. Throughout the course students will be encouraged to work at individual paces, utilizing high or low impact moves where appropriate. Through instructor-led group movements, with the use of music, brief explanations of basic aerobic principles, definitions and guidelines for proper technique will be covered. This is a great class for someone who does not like to follow choreography. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring, Summer)**

WFIT-027

Cardio Mix

This athletic style class will focus on helping students improve their cardiovascular endurance using various formats such as: Kickboxing, TurboKick, Insanity, P90X, Cize, High Intensity Interval Training (HIIT) and sports specific athletic drills. Each of the workouts will demonstrate proper alignment, posture and core strength. The movements emphasize simultaneous engagement of the anterior lower core and the posterior upper core. This course is appropriate for all fitness levels. **Fee: A course fee applied via SFS bill. See Course Notes for fee information.** **Activity 2, Credits 0 (Fall, Spring)**

WFIT-028

Cardio, Strength and Core

This class will provide a variety of cardio work outs along with a mix of high intensity interval training (HIIT) core strengthening and conditioning. High-intensity interval training (HIIT) describes any workout that alternates between intense bursts of activity and fixed periods of less-intense activity or even complete rest. According to a 2011 study presented at the American College of Sports Medicine Annual Meeting, just 2 weeks of high-intensity intervals improves your aerobic capacity as much as 6 to 8 weeks endurance training. Because the intervals are short, you will be working hard the whole time. The trade-off is this format offers seasoned exercisers a new challenge and new exercisers a quick way to see results. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring, Summer)**

WFIT-029

Survival Fitness

Survival Fitness explores the development and maintenance of physical fitness as a requisite for survival in a primitive setting. Students will explore ways to improve overall strength and conditioning through various in-class survival-based exercises, games, and activities such as tracking, fire starting, shelter building, hunting and gathering. Students will also learn fundamental fitness center-based exercises such as deadlifts, farmers carry, pull-ups, and pushing and pulling movements to further enhance the ability to complete survival tasks. Are you strong enough to survive? This course will answer that question. **Activity 2, Credits 0 (Fall, Spring)**

WFIT-034**Core Glutes and Abs**

Core Glutes and Abs course will focus on developing/strengthening the body's core muscles, lower back, abdominals, hips, and gluteus. The body's core muscles are the foundation for all other movements of the body. Through use of Resist-a-Balls, weights, bands and conditioning exercises, the focus will be to develop and strengthen the body's trunk and pelvis area where the center of gravity is located. Benefits include improved posture, increased flexibility and range of motion, increased strength and protection of the spine, more stable center of gravity and controlled movement. This class is designed for all fitness levels. Instructor lead exercises and explanation of core principles and proper technique will be covered. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring, Summer)**

WFIT-035**Core and Flexibility**

This class will push your core to the limit with intense training using many different methods including stability balls, dumbbells, Bosu balls, and your own body weight. A person's flexibility refers to the ability of your joints to move through a full range of motion. Having flexibility in your muscles allows for more movement around the joints and you can achieve this with a basic or advanced stretching workout during this class. This is a perfect class for students looking to change their ab routine and see results without doing traditional crunches and floor work. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WFIT-037**Personal Training**

This course is designed for students who desire "1-on-1" Personal Training Services who wish to enhance their current fitness level or better improve upon their quality of life by participating in weekly Personal Training and independent workout sessions. Students will learn safe and appropriate exercise methods and techniques and will possess the ability to pursue regular independent exercise programs at the conclusion of this course. This course offers 15 individual Personal Training contact hours as well as a requirement to complete additional training hours through independent study/work outside of the time working with a Personal Trainer. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring, Summer)**

WFIT-041**Functional Training**

Simply defined, functional training involves compound (multi-joint) exercises that are meant to simulate common movements or tasks performed as part of our daily lives. This class will focus on skill development of many functional movements involving pushing, pulling, squatting, carrying and lifting. Because functional training movements involve multiple joints and muscle groups, workouts can be accomplished in shorter periods of time and generally require constant engagement of the "core" musculature. Each class session will involve a warm-up, skill development session and a specified workout of the day. All skill levels are welcome, however this course is recommended for those looking to explore their limits. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Spring)**

WFIT-042**Barre Fitness**

Barre Fitness uses a combination of postures inspired by ballet, yoga and Pilates that focuses on isometric strength training combined with high reps of small range-of-motion movements. The ballet barre is used as a prop for balance and the correct biomechanics of movement to increase strength, flexibility, stamina and dynamic stability. No previous dance experience required for this course. **Fee: A course fee applied via SFS bill. See Course Notes for fee information.** **Activity 2, Credits 0 (Fall, Spring)**

WFIT-046**Triathlon Training**

This fitness and conditioning course is for students who enjoy running as a means to cardiovascular health: designed for all types of runners who want to improve their running form and efficiency, improve their overall cardiovascular health, or even train for a race. This course benefits all fitness levels. Every-other class is active running, the other will be a classroom session/teach the different training methods of aerobic running, lactate threshold, VO2 max training, etc. The how to's of structuring one's own running program will be covered. There will also be components on proper nutrition and shoes. Students will also learn about the resources available to race and train with others in their community. The overall goal is to provide for proper training while also improving running performance. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WFIT-055**Kickboxing**

This course is designed to develop physical fitness, strength, stamina, power, speed, endurance and flexibility. Students will have the opportunity to develop self-defense skills by utilizing the combination of boxing and karate techniques. Instructors will introduce basic kicking and punching skills and combine the element of aerobic activity with music to provide an outstanding work-out. Students will be encouraged to enhance their overall health, thus helping them look and feel good about themselves. Teaching methods include explanation, demonstration, program guidance and motivational lecturing. Boxing gloves are required and can be purchased locally (students must provide their own gloves). Instructor will provide purchasing information. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WFIT-058**Indoor Cycling**

The Indoor Cycling: Essentially is a form of exercise with classes focusing on the energy zones: endurance, strength, intervals, high intensity (race days) and recovery, that involve using a special stationary exercise bicycle with a weighted flywheel. Because Indoor Cycling provides both high-intensity workouts and active recovery, without stress to the joints often associated with running, participants can experience a personalized ride every class. By focusing on specific training objectives during each class, students can map out a training plan to maximize results. *Note: Indoor Cycling classes may vary in terms of general course content based on student/class interest (some Core/Abdominal work and Sculpting/Resistance training may be added to course content). **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring, Summer)**

WFIT-059**Indoor Cycling and Core**

This course is a combination of indoor cycling and core exercises. The cycling portion will focus on energy zones: endurance, strength, intervals, high intensity and recovery. The core aspect will focus on the body's 29 core muscles, which are located mostly in your back, abdomen and pelvis. This group of muscles provides the foundation for movement throughout your entire body, and strengthening them can help protect and support your back, make your spine and body less prone to injury and help you gain greater balance and stability. Indoor Cycling involves the use a stationary bicycle with a weighted flywheel. The Indoor Cycling and Core provides both high-intensity workouts and active recovery, without stress to the joints often associated with running along with a solid core/abdominal work out. Participants can experience a personalized ride every class. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring)**

WFIT-064**Zumba Fitness**

Zumba is like no other workout you will ever experience. Zumba was created in the mid-90's for international pop superstars. Inspired by cumbia, salsa, samba and merengue, paired with Latin rhythms the red-hot international dance steps Zumba was born! Zumba (slang for "to move fast and have fun") has become one of the fastest growing dance-based crazes in the country. The music is infectious and the dance moves are easy to follow and have body- beautiful benefits. The instructor for this class will guide students through initial competence to highly challenging moves. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WFIT-065**Strong by Zumba**

STRONG by Zumba is a High Intensity Interval Training class using more traditional fitness moves for a more athletic, conditioning-style workout. Participants use their own body weight as resistance to achieve muscle definition. There are movements inspired by dance but these are very limited compared to a Zumba class, so it's perfect for those not comfortable in a full-out dance class. (A traditional Zumba class is based on the integration of dance and dance-type movements, creating a high-cardio, total-body workout.) Both classes are driven by a unique musical experience with no instructor cueing. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring)**

WFIT-069**Rowing for Fitness**

The sport of competitive rowing dates back hundreds of years and is one of the oldest competitive sports still in existence today. In this class students will begin by learning proper rowing technique and will then move on to complete weekly rowing assignments to enhance their overall fitness and to improve their general rowing competency. Class time will be spent utilizing modern rowing ergometers and software to track rowing progress and in the fitness center completing strength programs to enhance rowing capacity. Students will have the opportunity to compete in informal in-class racing between other class participants and also compete against other rowers worldwide by utilizing online racing venues. While this class is well suited for novice rowers, more experienced individuals are also welcome to enroll. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WFIT-070**Swimming for Fitness**

This fitness and conditioning activity course is designed for students who enjoy the venue of swimming to develop cardiovascular health. Designed for intermediate-advanced swimmers. This is NOT an instructional swimming class. The course will focus on: General aquatic fitness; stretching; all swimming stroke refinement and development; lap swims, sprints, combination of times laps and outlined swim practices. Cool down sessions will take place followed by ideas for muscular strength and endurance development (outside of aquatic environment). This course is a perfect fit for individuals who wish to pursue physical fitness development in a "non-impact" situation. *Note: Students must provide their own swimming attire. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

Recreation and Wellness

WFIT-073

Bootcamp

"BOOTCAMP" is an exciting full-body conditioning fitness program that is designed to challenge, tone, trim, stretch and completely exercise your body in 10 intense weeks. Whether you're a workout novice looking to jump-start a healthier lifestyle, training for a special event such as a wedding or high school reunion, or an athlete looking for a new challenge, this program can help you reach your fitness goals while enjoying it! Boredom is not an option in this 2 day a week program based on philosophies from both personal training and group fitness by combining calisthenics, plyometrics, resistance training, cardio challenges, relay races and partner drills, you get an action packed workout in one exciting hour. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WFIT-075

Sports Performance Training for Athletes

This course is designed for students with an athletic background looking to utilize current training methods to enhance their physical performance. Course work will involve group training sessions and will take place in the Hale Andrews Students Life Center and Gordon Field House, as well as adjacent track and field complexes. Students can expect each class to offer a variety of challenging exercises and/or drills that will focus on aspects of health and skill based fitness. All exercises and training programs will be modified to meet the individual needs of each student, but it is recommended that course participants already possess a base level of fitness prior to registering in the course. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WFIT-076

Intro to Weight Training

Basic weight training fundamentals offer beginners/intermediates the chance to build strength through method discovery. Content includes: stretching; flexibility; spotting; safety; free weights; cybex; the different kinds of program designs; and cardiovascular development. Course design will focus on individual need and desire, leading to unique and successful program designs. Instructors will present information on muscle development, basic CV training; use of free weights and Cybex equipment. Highlight: Individual program effort. Class work involves initial orientation, handouts/discussion, definitions, Cybex station techniques; free weight specifics, and routine development for total body work. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WFIT-077

Intro to Olympic Weightlifting

This course will answer questions on why Olympic Weightlifting is extensively used by both athletes in power sports as well as CrossFit programs. During training sessions students will learn how to go from never experiencing these lifts before to being competent in performing them. Students will leave the course understanding what muscles are developed and how they are involved in the movements. Each student will learn how to properly execute the Snatch and the Clean and Jerk by the end of the course and will learn how to properly incorporate these lifts into their training sessions. **Fee: A course fee applies via SFS bill. See course notes for fee information.** **Activity 2, Credits 0 (Fall, Spring)**

WFIT-078

Intro to Powerlifting

This course will answer questions on why powerlifting is extensively used by both athletes in power sports as well as CrossFit programs. During training sessions students will learn how to go from never experiencing these lifts before to being competent in performing them. Students will leave the course understanding what muscles are developed and how they are involved in the movements. Each student will learn how to properly execute the Back Squat, Deadlift and Bench Press by the end of the course and will learn how to properly incorporate these lifts into their training sessions. **Fee: A course fee applies via SFS bill. See course notes for fee information.** **Activity 2, Credits 0 (Fall, Spring)**

WFIT-082

Core Fusion

Currently PiYo now Core Fusion: This course dramatically transforms the body to help look, feel and perform better. Core Fusion is an athletic blend of Pilates, Yoga and so much more? It includes modifications for the group exercise environment, yet also offers progression to challenges for all levels of student participants (Faculty/Staff are welcome too).Core Fusion exercises are selected and balanced through strategic variations (pose angles and application of force), with each specific movement. Each Core Fusion class session builds on the last to increase exercise adherence and avoid hitting "plateaus". **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WFIT-085

Pilates

This course will progress from Pilates fundamentals and basic exercises to a traditional intermediate level workout by the final class. Pilates focuses on abdominal strength, stability of the pelvis, flexibility and balance. Mindful, intelligent movement and a deeper understanding of your body is the goal. Relaxation and some stretching may be added to the traditional mat work of Joseph H. Pilates. An Intermediate section assumes that the student has knowledge in Pilates fundamentals and the mechanics of basic classic exercises. Class will be more vigorous and will begin to develop concepts of flow and transition. The class will move and flow more than the beginner level.*Note: Previous experience in Pilates or a previous class in Pilates is required for Intermediate sections.**Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WFIT-086

Pilates Bootcamp

Pilates Bootcamp will combine classic Pilates with traditional Boot Camp exercises, such as plyometrics, squats, lunges, and resistance work. Classes will be fast-paced and dynamic, providing a total body workout, while remaining true to the Pilates principles of Control, Concentration and Centering. Students will work to improve not only core strength, but also balance, muscle tone, flexibility, alignment and posture, while conditioning the total body. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WFIT-088

Extreme Fitness

Extreme Fitness is an exciting indoor full-body fitness program that will challenge, tone and trim your body in 15 intense weeks. Whether you are a novice or an athlete looking for a new challenge, this class will help you reach your fitness goals! Definitely challenging-working core muscle groups, endurance, PiYo type activities-they are all part of this newly designed, very dynamic class. Boredom is not an option in this class. By combining calisthenics, plyometrics, resistance training, Cardio, relay races, partner drills--you get an action packed workout in every session. Similar to "bootcamp" but very much designed for those who want the "ultimate" fitness experience! **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WFIT-089

Fitness Infusion

Fitness Infusion is a full-body group exercise class. The format will include a wide range of intensities to accommodate different fitness levels. Instructors will include body weight exercises, dumbbell and resistance band work, high intensity interval training, stations, and other formats based on student goals. **A course fee applied via SFS bill. **Activity 2, Credits 0 (Fall, Spring, Summer)**

WFIT-090

120 Day Challenge

Get ready to burn fat, boost your metabolism, and get lean. This class uses resistance training to get you better results in less time. The routine is based on proven techniques that shift your fat-burning focus from cardio to resistance training. By adding resistance training for a full Semester (120 Days), you'll build lean muscle, and that is what supercharges your metabolism so you burn fat longer after your workout even while you sleep! *Note: It is recommended that students register for a cardio class on alternate class days if possible to compliment this routine. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WFIT-091

Ninja Training

This course is inspired by the recent surge in popularity of obstacles course style races and the practice of free running as a means to enhance one's physical fitness. Students in this course will begin with fundamental movement and balance skills and will eventually progress to informal in-class obstacle course races with elements similar to those seen in the popular hit television show, American Ninja Warrior. All abilities are welcome to participate since all skills and movements will be custom tailored to meet in the needs of each individual student. This course will not have any martial art component, but you will learn how to move like a ninja! *Note: This course takes place off campus at Rochester Parkour, 1344 University Avenue, Rochester, NY. RIT does not provide transportation however car-pooling does exist. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring, Summer)**

WFIT-092

Nerfology

If you find games such as Humans versus Zombies, Airsoft, Laser Tag, or Paintball enjoyable, then this class is for you! This class takes a different approach to fitness by incorporating fun and competitive gameplay with the use of simple tracking systems, such as pedometers, to enhance student physical fitness and health. Students will participate in a variety of fitness-based foam dart tag games in both indoor and outdoor settings. Students will track their movement in each class setting through the use of pedometers to gauge the distance they travel. . **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring)**

WFIT-093

Sunrise Yoga

Yoga is a practice of uniting the mind, body and spirit. As such, this class focuses on physical postures as well as yogic philosophies as taught through the eight limbs of yoga. Primarily, this class is about building a solid foundation in basic yoga poses and is appropriate for those who are new to yoga as well as students that are working on refining their yoga practice. The class puts emphasis on developing strength and flexibility through asana, conscious breathing in pranayama, relaxing and de-stressing through meditation. Pose modifications are demonstrated and encouraged. This class alternates in working at a moderate pace in the vinyasa style of connecting movement and breath while moving continuously; and in working through sequences of postures held for several breath cycles, focusing on precise principles of biomechanics. Attendance is required. Recommended clothing is comfortable and loose fitting. Mats and props are provided. Music is used to create an environment appropriate for mindfulness of movement and reduce external distractions. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring)**

WFIT-094**Yoga**

A body/mind discipline, Yoga enables posture improvement, flexibility development and learned relaxation. Mastered through learning an ancient posture series incorporating breath control, the body and mind relationship is explored. The practice of meditation gives one an opportunity to experience stress management. Relaxation is Yoga practice's key. Attendance is required. Classes contain sequential stretches, postures and relaxation exercise, incorporated with breathing and visualization. Recommended clothing is comfortable and loose fitting. Mats are provided. Music featuring New Age and mainstream artists provide an inspiring atmosphere. Hatha Yoga exploration includes a diverse discipline collection for improving mental and physical health. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WFIT-095**Vinyasa Power Yoga**

Vinyasa Power Yoga is built upon traditional yoga poses, while at the same time adding several variations and extensions to the poses along the way. Unlike meditative yoga, the pace of this class provides a steady flow through a series of vinyasas (downward dog, plank, and upward dog) that keep the body engaged in a steady flow of movement. The pace of this movement offers cardiovascular conditioning, as well as an opportunity to challenge your strength and build your flexibility. The practice will offer you the opportunity to focus on your inner self and integrate and balance your body, mind, and spirit as one being. All levels welcome. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WFIT-096**Hatha Yoga**

Hatha Yoga is a mind/body course that focuses on posture improvement, flexibility development and learned relaxation using visualization. These methods are mastered through learning an ancient posture series incorporating breath control to explore the body and mind relationship. The practice of meditation gives students an opportunity to experience stress management through relaxation. The music format features new age and mainstream artists to create an inspiring atmosphere. Hatha Yoga exploration includes a diverse collection for improving mental and physical health. **A course fee applies on the SFS bill. **Activity 2, Credits 0 (Fall, Spring, Summer)**

WFIT-097**Kundalini Yoga**

Kundalini yoga as taught by Yogi Bhaajan is a 5,000-year-old authentic system of yoga exercise and meditation that promotes health, happiness, and spiritual awareness. Kundalini yoga is taught in over 300 centers in 35 countries by teachers trained through the international Kundalini Yoga Teacher's Association--combining breathing, movement, stretching and sound, Kundalini yoga is a safe, comprehensive technology that can be practiced by everyone. Through yogic breathing and meditation peace of mind can be obtained, giving an experience of deep inner calm and self-confidence. Kundalini yoga is more than a system of physical exercise. The technology is aimed at the spirit that has no boundaries therefore, it is universal and non denominational. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WFIT-098**Functional Yoga**

Yoga enables posture improvement, strength and flexibility development and learned relaxation. Students will explore their own behavioral habits such as sitting for long periods and routinely putting the body in positions that foster tight lower legs, hyper-kyphosis, back and knee issues. All students with athletic and non-athletic hobbies, everything from running to cycling or desk-jockeys and glass-blowers, will find a niche. Based on the students' identified needs, the class will have the opportunity to work on the body's muscular structure by practicing poses that affect these life activities. This class will teach how to refine basic yoga poses with deeper integration of healthy alignment actions. By combining breathing, movement, stretching and static poses, students will learn safe, comprehensive poses useful on the mat, as well as in their life activities. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring)**

Health and Safety

WHLS-010**CPR and First Aid**

This course is designed to provide certification by the American Red Cross for CPR and First Aid. Upon successful completion of the course, students will receive certification cards for CPR and for First Aid. Students will be presented with information on the following skills that apply to: Infants, Children and Adults: Rescue Breathing, Blocked Airway for a conscious/unconscious person, CPR, responding to an emergency situation, controlling bleeding and splinting techniques. Class sessions include the use of video tapes, lectures, demonstrations, partner practice and skill evaluation (by the instructor). All equipment (mannequins, mats, wraps) are provided by RIT. *Note: "CPR Pro" is offered optionally. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring, Summer)**

WHLS-012**Advanced CPR and First Aid**

This advanced CPR course is designed to provide certification by the American Red Cross for CPR for the Professional Rescuer and First Aid. Upon successful completion of the course, students will receive certification cards for CPR for the Professional Rescuer and for First Aid. Class sessions are 2 hour formats. Students will be presented with information on the following skills that apply to: Infants, Children and Adults: Rescue Breathing, Blocked Airway for a conscious/unconscious person, CPR, AED, 2 Person CPR, Use of the Bag Valve Mask, Triple Airway maneuver, responding to an emergency situation, controlling bleeding and splinting techniques. Class sessions include the use of video tapes, lectures, demonstrations, partner practice and skill evaluation (by the instructor). *Note: All equipment (mannequins, mats, wraps, face masks) are provided by RIT and included in the course fee. Students must purchase the textbook. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring)**

WHLS-020**Lifeguarding**

Lifeguarding RIT's Lifeguarding course is designed to provide students with a certification by the American Red Cross (ARC). Training consists of methods for individual rescue around and in the water. Basic skills and concepts will be presented. Objectives are: Successful completion and certification for each individual by the final class day. Prerequisites for this course include a continuous 500 yard swim and demonstrated accomplishment in the front crawl, side stroke, and breast stroke. *Note: Students are required to have or purchase a lifeguarding textbook. The course fee via SFS bill includes the required face mask. The textbook can be purchased at the RIT bookstore. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WHLS-030**Water Safety Instruction**

Water Safety Instruction (WSI), a certification course through The American Red Cross, enables students to teach swimming and lifesaving classes following successful completion. Preparation for teaching proper Red Cross classes follows instruction in lifeguarding skill review, strokes, teaching methods, class structuring and organization. class prerequisite. Assignments, quiz evaluation and a written course final are given. An intriguing course exploring teaching methods and problems, WSI allows actual teaching experience within the class curriculum. *Note: Current Lifeguarding certification is required as a class prerequisite. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Spring)**

Health and Wellness Seminars

WHWS-001**Wellness for Life**

Wellness for Life is an online course designed to help students discuss, respond, and reflect on wellness-related topics as they relate to their personal approach to wellness. Students will be presented with multidimensional wellness concepts associated with collegiate experiences using the 7 dimensions of wellness. **A course fee is applied via SFS bill. **Activity, Credits 0 (Fall, Spring)**

WHWS-002**Wellness Challenge Exam**

This core wellness course is designed specifically as a "test out" option for students wishing to complete a wellness activity class for graduation. Strong wellness background is required (multidimensional). *Note: Textbooks are available to prepare for the exam in the RIT Bookstore (Wellness: Concepts and Applications by Anspaugh, Hamrick & Rosato). * Students should contact Dugan Davies at: dugan.davies@rit.edu , SLC 1260. Study guides are available in the SLC Lobby. Students must contact the instructor directly for more info & set up exam date. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WHWS-003**Everyday Nutrition**

This course is an introduction to the role of nutrition in human health with respect to essential nutrients, factors that affect eating habits, food advertising, nutrition and disease and establishing a healthy lifestyle. **Fee: A course fee applies via SFS bill. See course notes for fee information. **Activity 2, Credits 0 (Fall, Spring)**

WHWS-004**Introduction to Massage Therapy**

Massage Therapy is fast becoming an accepted part of many rehab programs & has been proven beneficial in many acute and chronic medical conditions. It aids in the relief of stress, arthritis, sports injuries, trauma and many other conditions of pain and discomfort. There are many forms of massage: Medical, Orthopaedic, Swedish, Therapeutic, Myofascial Trigger Point, Myofascial Release & Acupressure, for examples. Licensed Massage Therapists trained in New York go through extensive training in the US. They are REGISTERED and are BOARD CERTIFIED after passing the State Boards. Most states require the therapist to have passed the state tests in order to practice in the state they reside in. The vast majority of therapists go on for additional training. Anyone can feel a need for some kind of therapy to relieve stress, chronic or acute conditions. This course provides SIMPLE but effective methods of relieving stress and the freedom of enjoying everyday activities. Welcome to a new and sacred adventure that will promote your health and total well-being. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

Recreation and Wellness

WHWS-005

Finding Your Passion

Finding Your Passion is an online, asynchronous course designed to provide students with the tools and processes to incorporate joy, passion, and purpose into their life path. Students will complete The Passion Test and identify their top five passions and create the "markers" for each one. **Fee: A course fee applies via SFS bill. See course notes for fee information. **Activity 2, Credits 0 (Fall, Spring)**

WHWS-006

Motivation and Leadership

What inspires you? Who motivates you? Would you like to learn more about how you can motivate others? Many people, past and present, stand out as great leaders, but what makes them great? Each one of us can learn from our experiences and challenges, using these opportunities to lead, inspire, and motivate in our own way. Can you? Register for this course and find out! LEARN about leadership styles and discover your own along the way. EXPLORE what keeps you motivated through stressful and challenging times. LEARN from past examples by examining great leaders—their characteristics, and their great speeches. GET STARTED on the road to becoming a better leader and motivator! **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. **Activity, Credits 0 (Fall, Spring)**

WHWS-007

Your Health, Your Style: Assessments, Themes and Strategies

Your Health, Your Style is an online asynchronous class that will provide strategies, explanations and health perspectives to various wellness themes including themes such as, accountability, adherence, balance, awareness, choices, character, discipline, focus, and consistency. Students will be asked to apply the information they learn in each theme to their personal lives. The goal of this course is for students to acquire new perspectives that can result in behavior change. **Fee: A course fee applies via SFS bill. See course notes for fee information. **Activity 2, Credits 0 (Fall, Spring)**

WHWS-008

Financial Fitness

Fitness doesn't just have to mean working out in the gym. Learn how you can become financially fit! This course will give you that foundation. Learn about important topics that include: the time value of money, budgeting, taxes, credit (good debt vs. bad debt), buying vs. leasing a car, banking, housing, financing college and much more. You will learn tools on how to best manage your resources and gain a basic understanding of the complex world of personal finances. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. **Activity, Credits 0 (Fall, Spring)**

WHWS-009

Eating, Body Image and Food

This course focuses on healthy and unhealthy eating behaviors, body image, and attitudes toward food. We will address factors which influence body image, dieting behaviors, cultural influences on eating and body image, obesity, eating disorders, and healthy eating. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. **Activity, Credits 0 (Fall, Spring)**

WHWS-010

Friends, Foes and Lovers

This course is designed to provide students with educational concepts and strategies regarding relationships while keeping personal safety in mind. Instructors and students will explore the topic of relationships (friends, dating, and partnerships) and being able to set appropriate boundaries so that relationships are able to thrive. Issues of Relationship violence, stalking and sexual assault will also be addressed throughout the course. *Note: This course is taught by the staff from the Center for Women and Gender. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. **Activity, Credits 0 (Fall, Spring)**

WHWS-012

Personal Healthcare

This course is an introduction to the importance of independent, mature decision-making, rights and responsibilities as a healthcare consumer. This course will help students to navigate the healthcare system including the continuity of care, health insurance under the new ACA (Affordable Care Act), healthy lifestyles and sexual responsibility. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. **Activity 2, Credits 0 (Spring)**

WHWS-014

Meditation: Inner Power and Resilience

Meditation: Inner Power and Resilience is an online course that is centered on meditation to tap into, and strengthen, a student's inner resources to amplify their personal best in any situation, leading to a positive and fulfilling college experience. Through the understanding and practice of meditation, students will explore approaches to creating a positive mindset which will in turn increase their mental and emotional well-being. **Fee: A course fee applies via SFS bill. See course notes for fee information. **Activity 1, Credits 0 (Fall, Spring)**

WHWS-015

Stress Management

This course focuses on the dynamic ways that students can effectively manage stress. Today's fast-paced daily grind can easily become overwhelming for people. It is difficult to balance the various duties and responsibilities that we, as a society face on a daily basis. This course will examine what stress is, how stress affects the body and how to effectively manage stress in a healthy fashion. Students will have the opportunity to experience a variety of different stress management techniques in order to determine which ones are best suited for them: Deep breathing, massage, tai chi practices, yoga and muscle relaxation are just a few of the techniques that will be introduced. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. **Activity, Credits 0 (Fall, Spring)**

WHWS-016

Kundalini Yoga

Kundalini yoga as taught by Yogi Bhanan is a 5,000-year-old authentic system of yoga exercise and meditation that promotes health, happiness, and spiritual awareness. Kundalini yoga is taught in over 300 centers in 35 countries by teachers trained through the international Kundalini Yoga Teacher's Association—combining breathing, movement, stretching and sound. It is a safe, comprehensive format that can accommodate all fitness levels. Through breathing and meditation, peace of mind can be obtained, giving an experience of deep inner calmness and self-confidence. This class is universal and non-denominational. **A course fee is applied via SFS bill. **Activity 2, Credits 0 (Fall, Spring)**

WHWS-017

Creativity and Addiction

This class will cover the addiction process while exploring many great minds from art genres and other disciplines who had struggled and lost their battle or are in recovery with this disease. For example Jimi Hendrix, Frida Kahlo, Steven King and Paul Erdos to name a few. In addition we will explore artist's genres whose lives were not interrupted by an addiction. Variety of resources will be explored to use on your creative journey in life drug free. **Activity 2, Credits 0 (Fall, Spring)**

WHWS-018

How to Become Smoke Free

This course is a self-help, low stress and "no test" class. If you have tried to quit smoking before, take comfort in the fact that most smokers try several times before successfully quitting. Your past attempts are not failures, but rather a step in the process towards becoming a non-smoker! The information presented in this class will help to ease your way through the quitting process. Discussions will include: Techniques to become "smoke free"; healthy behavior changes; stress management strategies and more! So, join your friends and learn how to quit together! *Note: Options to obtain nicotine replacement therapy are available through the N.Y. Quits and RIT Student Health. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. **Activity, Credits 0 (Fall, Spring)**

WHWS-019

Self-Reflection: Stretch and Sketch

Self-reflection is the key to self-awareness. It allows us to look neutrally at our thoughts, feelings, emotions, and actions. Paired with animation and movement, we are able to look at ourselves with newfound interest and curiosity. Animation requires the careful study of movement, and what better way to learn more about movement than to move? This combination of weekly physical activities and observational sketching provides an opportunity to engage in a variety of different actions. Activities in the circuit will include yoga, Pilates, active stretching, Barre, racquet sports and students choice. Students will develop dynamic drawing skills while participating in the observation circuit. A circuit-style structure will weave action and observation, with all participants cycling through both for the duration of each class. **A course fee is applied via SFS bill. **Activity 2, Credits 0 (Fall, Spring)**

WHWS-020

Dialogues on Spirituality

This course explores some spiritually-related topics, and shows how spirituality plays an important part in our daily life. It offers an opportunity to become more familiar with spiritual teachings from various spiritual masters and beliefs, and to recognize areas in oneself that are ripe for further growth. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. **Activity, Credits 0 (Fall, Spring)**

WHWS-021

Spirituality and Health

This interactive course, through multiple aspects of spiritual exploration, will focus on understanding some of the laws that govern all of life. A human is a four-fold being governed by physical, mental, emotional and spiritual laws. When you learn to live and apply these teachings, you solve many human problems. These self-mastery techniques: Meditation, contemplation, mysticism, color therapy, the power of intentions, sacred spaces, charkas, chanting, labyrinths, dowsing, visualization, healing and developing intuition are aimed at the spirit which has no boundaries and therefore is universal and non-denominational. This course focuses on the discovery of the wisdom within and developing the capacity to sense, understand and tap into the highest parts of yourself, others and the world around you. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. **Activity, Credits 0 (Fall, Spring)**

WHWS-022**Meditation Practices**

Learn and practice a variety of meditation techniques that develop mindfulness, concentration, tranquility and insight. This approach to wellness is one that can assist you in reducing stress and anxiety by the way of thought, contemplation and reflection. Through this course students will gain an understanding of the physical as well as the emotional benefits of meditative practices. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.**
Activity, Credits 0 (Fall, Spring)

WHWS-023**Inclusive Leadership**

This interactive course examines how distinctive populations, when properly integrated and included as equals, can enhance performance within working teams and organizations, foster innovation, and attain common goals and functioning. **Fee: A course fee applied via SFS bill. **Activity 1, Credits 0 (Fall)**

WHWS-024**Wellness Seminar Special Topics**

This course will provide students the opportunity to participate in a course designed to address modern topics in wellness that currently affect college students. Different courses may be offered each semester focusing on a special topic in wellness. **Activity 2, Credits 0 (Fall, Spring, Summer)**

WHWS-025**5 Steps to Prevent Diabetes**

5 Steps to Prevent Diabetes is a course that is based on the Center for Disease Control's Diabetes Prevention Program. This evidence-based program focuses on lifestyle changes to help prevent Type 2 (T2) Diabetes. Lifestyle changes include daily nutrition habits, increased activity levels, good sleep hygiene, stress management and positive mindset. Individuals who have high blood pressure, prediabetes, and family history of diabetes and/or are overweight would benefit from this course. **Fee: A course fee applies via SFS bill. **Activity 2, Credits 0 (Fall, Spring)**

Interactive Adventures**WINT-001****Teambuilding Tools**

Do you want to be an effective leader? Do you want additional resources and know-how that make your leadership skills a step above the rest? Whether you are an aspiring leader, already gravitate towards the head of the pack, or just want knowledge on tools that make teams better, this class is for you. This course will present and discuss how to create experiences in team building without the benefit of having a ropes course. We will discuss the history and use of experiential activities, stages of group development, activity briefing/debriefing and safety considerations. We will spend time setting up and experiencing a variety of activities and games that require little or no props and can be easily transported. We will discuss where to find additional activities, curriculum ideas and how to use these activities and strategies to make your own endeavors more successful. * **Fee: A course fee applied via SFS bill. See Course Notes for additional details on class meeting times. * **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WINT-003**Primitive Bow Making**

In this class, students will be guided through the process of constructing their own primitive bow, beginning with seasoned stave and fabricating their their own bow by hand. Topics covered will include wood selection and harvesting, bow design and performance, tillering, and shooting with the final product. The class will cover primitive bow building on a conceptual level as well as each step in the technical fabrication process. **Activity 2, Credits 0 (Fall, Spring, Summer)**

WINT-004**Wilderness Survival**

This is an introductory course to wilderness survival using primitive skills. This class will take place outdoors, and will integrate natural conditions and seasonal changes into teaching (a.k.a rain or shine, day or eve). Students will learn time-honored mentoring techniques, cutting edge practices and traditional ecological knowledge to master an ancient understanding of their environment and their role within. Students will leave this course with a strong base in fire-building, shelter building, tracking and edible/medicinal plant I.D. to address navigation, hunting, wood carving, wild crafting and wilderness cooking and Leave-No-Trace ethics. *Note: See Course Notes for additional details on class meeting times. * **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring)**

WINT-005**Backcountry Living**

This is an introductory course in backcountry living. We will work in and out of the classroom to incorporate essential outdoor skills involved in backcountry camping and overnight basics. Students will leave this course with a strong base in fire-building; campsite selection and set up; outdoor cooking; rope work; shelter building; wilderness first aid; hypo/hyperthermia prevention, detection and care; and Leave-No-Trace ethics. *Note: See Course Notes for additional details on class meeting times. * **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WINT-007**Intro to Permaculture Design**

Permaculture is the study and practice of the way human beings, as individuals and Communities, can participate in the creation of ethical, socially just, and ecological support systems. We present a whole systems design approach that integrates plants, animals, buildings, people, communities, economies, and the landscapes that surround us through careful analysis and thoughtful design. The course introduces students to the principles and practice of permaculture design through collaboration on real-world projects with an eye towards repairing, restoring, and regenerating human ecosystems. *Note: See Course Notes for additional details on class meeting times. * **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring, Summer)**

WINT-009**Orienteering and Land Navigation**

In this course, participants will dive into the art of always knowing where you are and how to get where you want to go in the wilderness. By better understanding how to use a topographical map and compass, participants will build a toolset to find their way out of any situation. This course involve map reading, proper use of compass, route finding, safe travel off-trail, and advanced tools such as GPS. While some of the course work is theoretical the majority of time will be spent doing hands on work in the great outdoors. Some activities may include, orienteering events, map and compass navigation challenges, geocaching trips, and wilderness adventure preparation. *Note: See Course Notes for additional details on class meeting times. * **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WINT-010**Maple Syrup and Our Environment**

This class will explore maple syrup production—both by way of micro production and as the yield of larger scale agriculture—as the product of a delicately strung web of environmental factors. As such, this hands-on and in-the-woods exploration of how maple syrup is produced will involve integrally related environmental topics and issues such as climate change, forest ecology, invasive species, and broader issues of sustainability. Through both classroom lecture and practical exercises in the woods, students will learn tree identification, the biology of sap production, the role of weather patterns, nutritional benefits of maple syrup, and the history of maple syrup production and its economic significance. Students will learn and actually carry out the processes of identifying trees for tapping, harvesting sap, and converting the harvested sap into their very own maple syrup. Students will learn outdoor preparedness, leave no trace wilderness ethics, and use of snowshoes for winter foot- travel. *Note: See Course Notes for additional details on class meeting times. * **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring)**

WINT-011**Adventure Sampler**

This class is a perfect way to experience a variety of adventure sports at an introductory level without a semester –long commitment to an activity you are unfamiliar with. With the expert guidance of a trained instructor, you will get to experience short modules that begin with the most fundamental skills like basic outdoor clothing, equipment, and preparation, and progress to activities like hiking, orienteering, beginner canoeing, and more! This class will utilize the “challenge by choice” philosophy and will focus on positive support and encouragement to allow students to safely explore activities that might otherwise seem too daunting. If you are new to adventure sports or just want a sampler of a variety of activities, this class is for you. While activities may not be physically strenuous, students should be prepared for situations that might be psychologically challenging including being on deep water, heights, and being in wilderness settings. Proof of health insurance is required to take this course. *Note: See Course Notes for additional details on class meeting times. * **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring)**

WINT-012**Intro to Bees and Beekeeping**

Did you know that honey bees pollinate one third of the food we eat? Honey bees are complex social organisms whose role in both our environment and economy is often under-recognized and under-appreciated. This class will serve as an introduction to bees and beekeeping and will involve an exploration of the life cycle and social habits of honey bees, basic bee-keeping skills, honey production and its nutritional benefits, governmental legislation around pollinators, and the honey bee's key role in global agriculture. Furthermore, we will examine the declining honey bee population and its critical consequences by way of investigating farming practices and individual behaviors that can either exacerbate or help reverse this trend. **Activity 2, Credits 0 (Spring)**

WINT-013**Trail Running**

those new to the sport. Students will learn through both lecture and guided experience to engage in the best practices of trail running. Students will acquire basic knowledge of the keys to the sport including; fitness, nutrition, trail running gear, proper trail use and an enhanced knowledge of local parks and trail running resources. Students will leave this course with the skill set to go out and become confident trail runners. Participation in this class requires proof of health insurance.*Note: See Course Notes for additional details on class meeting times.* **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring, Summer)**

Recreation and Wellness

WINT-014

Hiking

In this class, students will learn all about and engage in the activity of wilderness hiking. Skills taught will include outdoor preparedness including choosing proper clothing for the wilderness, wilderness safety, proper nutrition for outings, reading weather, basic navigation and map-reading, hiking technique, Leave No Trace wilderness ethics as well as exposure to local parks and trail systems. Students must have proper clothing for outdoor excursions that occur in varying weather conditions. Proof of health insurance is required to take this course. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring, Summer)

WINT-016

Backpacking

This class will impart basic backpacking skills such as fitting and properly packing your backpack, camping skills, and general outdoor awareness and preparedness. These skills will be put to use on an overnight backpacking /camping trip. The difficulty of the hike will be based on the abilities of the class. Participants should possess boots/shoes for hiking as well as clothing appropriate for the wilderness. Proof of health insurance is required to take this course. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WINT-017

Backpacking Trail Maint

This course is designed to provide experience in backpacking and volunteer trail maintenance. Students will learn how to choose proper gear, work together as a team and care for the trail they are hiking on. Students will gain a basic knowledge of backpacking skills and equipment selection, learn how to work with trail organizations and trail maintenance projects, learn to demonstrate basic backpacking skills and gear terminology, participate in trail clean-up and preservation, and practice "leave no trace" camping/hiking ethics. This course consists of both (a) mandatory pre-trip session(s), as well as a weekend backpacking and trail maintenance excursion. Basic backpacking and camping gear are provided. Participants should possess boots/shoes for hiking as well as clothing appropriate for the wilderness. Proof of health insurance is required to take this course. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WINT-019

Beginner Backpacking

Explore the forests with your home in your pack. Sleep in tents or lean-tos, cook on camp stoves, and hike the trail as you learn about the lush history of the area. Class will focus on the essentials of backcountry camping: planning, communication, and execution. Learn to read the weather, a compass, and map; start fires using new and old tools; as well as interpret the flora and fauna of the trail. This class will follow Leave No Trace principles. All food will be provided. Hike requires the ability to walk for at least five hours with breaks. Participants should possess boots/shoes for hiking as well as clothing appropriate for the wilderness. Proof of health insurance is required to take this course. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WINT-020

Explore Hiking

This class will explore the local trails around your local community, the environment and their associated recreational opportunities. Students will learn about local geography, environmental history, flora and fauna identification, as well as leave no trace principles, navigation basics, trail etiquette and safety. This is a self-paced course, pairing online learning with students engaging in activities outside on their own time. Access to a hiking trail location and basic hiking equipment is required. This class is designed using resources accessible to students residing near Rochester NY, this course may be modified for students in other locations with instructor approval. Course Fee applies via SFS bill. Activity 2, Credits 0 (Fall, Spring, Summer)

WINT-021

Backpacking/Canoeing

This multi-activity course will involve a weekend wilderness trip consisting of both backpacking and open water canoeing; one day of one activity will be followed by one day of the other. Topics addressed will include basic backcountry foot-travel, wilderness camping, outdoor preparedness, paddling skills and canoe navigation, and Leave No Trace ethics. Participants should possess boots/shoes for hiking as well as clothing appropriate for the wilderness. Proof of health insurance is required to take this course. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity 2, Credits 0 (Fall, Spring, Summer)

WINT-025

Mountain Biking

Learn to mountain bike and improve your trail riding skills. Class highlights include: trail etiquette and safety, bike set-up, trail-side bike maintenance, control, balance, braking, weight transfer, terrain and stunt navigation, high-speed cornering, attack and descent on hills, and basic nutrition and hydration. Weekly group ride distances will be 5 - 7 miles per class, which includes daily drills and skills. IMPORTANT NOTE: Students must provide their own transportation to and from the trail each week. All students must have trail-worthy mountain bike and helmet. Class may be conducted on stationary spin bikes (indoors) when weather is unfavorable (determined by instructor). Proof of health insurance is required to take this course. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WINT-026

Bicycling

The main focus of this course will be on recreational cycling with an emphasis on cycling safety and rules of the road. In addition, students will learn about bicycle parts and terminology, riding skills and techniques, how to ride in a group, and basic bike maintenance. Throughout the class, students will be exposed to a variety of areas around Rochester where they can safely ride their bikes, including pathways and some roads. Students must have their own bicycle (road, hybrid, or mountain with road tires) in good mechanical condition, and equipped to meet all pertinent laws for daytime riding. *Note: Proof of health insurance is required. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity 2, Credits 0 (Fall)

WINT-028

Bicycle Care and Maint

This course is taught as a hands-on introduction to building, caring for, and maintaining. Students are supplied with a bicycle mechanic textbook which is theirs to keep. The focus of the course is to use the and book to discover the mechanical systems of a bicycle including: breaks, drive train, derailleurs, bearings, wheel truing and more. Bikes older than 1995 may require different tools to conduct class procedures. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WINT-037

Rock Climbing-Outdr Bouldering

This course is designed to expose students to the sport of Bouldering in an amazing outdoor setting. Climbing techniques, mental and physical preparedness, proper spotting and other safety techniques are presented. The sport of "Bouldering" is a type of rock climbing that involves shorter climbs or "problems" that require strategy and physical ability to complete. To protect falls for these shorter climbs, pads and spotters are used rather than ropes and harnesses. This is a physically demanding class! The first class meets at the Red Barn (required meeting) followed by one or more trips to outdoor bouldering venue. Proof of health insurance is required to take this course. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WINT-039

Rock Climbing-Indoor Bouldering

This class is designed to introduce and educate students about the sport of indoor bouldering. Bouldering is a form of rock climbing that does not use ropes and harnesses but involves shorter falls that are protected with padding. Subject matter will cover a variety of bouldering skills including body kinesthetics, route visualization, problem solving strategies, equipment use, as well as safety practices and protocols specific to indoor bouldering. Each class will consist of a lecture, demonstration and practice components allowing students to learn and practice the skills presented. All necessary gear and equipment will be provided. A course fee applies via SFS bill. See Course Notes for course fee and any details on class meeting times. Activity 2, Credits 0 (Fall, Spring)

WINT-041

Exploring Climbing

This class will explore the many facets of rock climbing, included but not limited to bouldering, top-rope, sport, and traditional climbing. Students will learn a variety of climbing skills including body kinesthetics, route visualization, problem solving strategies, equipment use, history and ethics, as well as safety practices and protocols specific to rock climbing. This is a self-paced course, pairing online learning activities with students engaging in activities on their own time. Students will need access to a climbing locale to fulfil the physical requirement of this course. Course Fee applies via SFS bill. Activity 2, Credits 0 (Fall, Spring, Summer)

WINT-042

Rock Climbing-Outdoor

If you have little or no climbing experience or are a gym climber looking to learn what outdoor rock climbing is all about, this course is for you. A major objective is to orient new climbers to the systems, protocols, & foundational techniques of rock climbing. Skills taught include knot tying, belaying, commands & safety checks, grips and effective footwork, and activities to help develop confidence, trust and efficient climbing kinesthetics. Proof of health insurance is required to take this course. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring, Summer)

WINT-043 Rock Climbing-Outdoor Advanced

For students who have previous experience & want to take it to the next level, this course is for you. A major objective of this course is to provide the foundations & rationales for the application of advanced climbing skills. Before traveling to a nearby crag, a meeting (required) will take place at the Red Barn & will cover basic skills and trip logistics. The 1st day of the trip will focus on active and passive familiarization, placement/evaluation, gear anchor systems and equalization methods. The 2nd day will focus on advanced rappelling techniques and an introduction to self rescue with remainder of the day spent on the rocks. Throughout the trip students will be introduced to the larger concepts involved in top rope anchor construction, rock climbing physics & risk management. All equipment & transportation is provided. Proof of health insurance is required to take this course. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring, Summer)

WINT-044 Rock Climbing- Indoor Top Roping

This class is designed to introduce and educate students about the sport of indoor top roping. Top roping is a form of rock climbing that uses ropes and harnesses; working in pairs climbers alternate between belaying and climbing to a fixed point at the top of a wall. Subject matter will cover a variety of top roping skills including belaying, rope management, route finding, equipment use, as well as safety practices and protocols specific to indoor top roping. Each class will consist of a lecture, demonstration and practice components allowing students to learn and practice the skills presented. All necessary gear and equipment will be provided. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity 1, Credits 0 (Fall, Spring)

WINT-050 Canoeing

This class involves instruction on canoe/equipment parts and terminology, water safety, launching and landing the canoe, paddle strokes and maneuvers, and opportunity to practice skills on flat or slow moving water. Day trips may involve ventures onto moving water with sections of mild white water (some isolated sections up to class II). Additional topics and skills taught will include ferrying, eddying, basic rescue/recovery techniques, river features and hydrology, and leave no trace wilderness ethics. Participants need to be comfortable both on and in the water, and be able to swim. *Note: Proof of health insurance is required. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity 2, Credits 0 (Fall)

WINT-053 Canoe Camping

Camping meets canoeing: learn to experience how a canoe allows for unique access to otherwise impractical camping opportunities while being able to carry a payload greater than what could be feasibly carried on your back. This class involves a required pre-trip training meeting followed by a weekend-long trip involving backcountry camping. Skills to be covered include basic paddling, safety and navigation, map reading and route-finding, camping skills such as tenting, fire-building, camp-cooking, and water purification, and Leave No Trace Wilderness Ethics. Students need to be comfortable on and in the water. Proof of health insurance is required to take this course. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring, Summer)

WINT-055 Whitewater Kayak Skills

This class focuses on the sport of whitewater kayaking and is taught using whitewater kayaks, which are shorter and more maneuverable than the longer recreational or touring kayaks. Instruction begins with basics and progresses to more advanced skills and techniques using drills, games and exercises leading up to, among other skills, a full Eskimo roll. Class is typically taught in the pool and covers the following skills, which are all important for river kayaking: Kayak parts, accessories and terminology, wet exits, hip snaps, paddle strokes, j-leans, Eskimo rescues and Eskimo rolls. All necessary gear and equipment is provided. Participants should be able to swim and expect to be in the water each class. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring, Summer)

WINT-056 Whitewater Kayaking

This class involves kayaking on whitewater rapids in vessels that are specifically designed for this purpose. Participants should have some, but not necessarily extensive, kayaking experience. Basic required skills are first taught in still water (typically in a pool) before the class progresses into the field on actual whitewater rapids. Skills taught include the basics of whitewater paddling, maneuvering, righting and rescue techniques, whitewater safety skills, river reading/navigation, ferrying, eddying and peeling. This class will involve paddling on easy to moderate whitewater. Depending on the skill level of the class, other more advanced skills may be introduced. Students must be able to swim and be comfortable on and in the water. WINT-055 is not a required pre-requisite but is a good introductory course and suggested for new paddlers to take first. Participation in this class requires proof of health insurance. A course fee is applied via SFS bill. See Course Notes for course fee information and information on class meeting times. (WINT-55 Co-req) Activity, Credits 0 (Fall, Spring, Summer)

WINT-057 Whitewater Kayaking-Lock 32

This class takes place at Genesee Waterways Center's Lock 32 Whitewater Park in Pittsford, NY. This class involves kayaking on whitewater rapids in vessels that are specifically designed for this purpose. No kayaking experience is necessary to take this class, but students should be able to swim and be comfortable on and in the water. Basic required skills are first taught in still water before the class progresses into whitewater rapids. Skills taught include the basics of whitewater paddling, maneuvering, righting and rescue techniques, whitewater safety skills, ferrying, eddying and peeling. This class will involve paddling on easy to moderate whitewater. Participation in this class requires proof of health insurance. See Course Notes for course fee information and information on class meeting times. **A course fee is applied via SFS bill ** Activity 15, Credits 0 (Fall, Summer)

WINT-058 Sea Kayaking

Sea kayaks are long, narrow, seaworthy vessels that have a covered deck and, in lieu of the maneuverability of a whitewater kayak, are designed to have higher cruising speed, cargo capacity, ease of straight-line paddling, and comfort for long journeys. This class will teach students how to safely and effectively paddle a sea kayak and use this type of vessel for extended open-water trips. This class includes an overnight sea kayaking trip and involves camping that may be in a wilderness environment. Proof of health insurance is required to take this course. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring, Summer)

WINT-059 Stand Up Paddleboarding

Stand Up Paddleboarding is an activity that is relatively easy to learn, and provides a wide array of opportunity for leisure, fitness, and appreciation of the outdoors. This class will focus on the skills of Stand Up Paddleboarding, and the many leisure and fitness opportunities it affords. You can expect to learn all the basic skills necessary to enjoy this sport on any body of flat water. Each class will deal with components of each: equipment, technical skills and language, etiquette and safety. This class may meet both in the classroom and out on the water. Student should be able to swim and feel comfortable on and in the water. Proof of health insurance is required to take this course. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity 2, Credits 0 (Fall, Spring, Summer)

WINT-060 Winter Hiking

This class is designed to utilize the sport of winter hiking, using snowshoes as weather and snowfall permit, as a means of promoting and imparting physical fitness, outdoor preparedness, outdoor winter skills and knowledge of our local parks and natural resources. Students can expect to gain the necessary knowledge to continue enjoying this sport on their own. This class will take place in various local trails and parks. Snowshoes are provided for class use. Participants should possess sturdy boots for hiking as well as clothing appropriate for a winter, wilderness environment. *Note: Proof of health insurance is required to take this course. See Course Notes for course fee and any details on class meeting times. **Fee: A course fee applied via SFS bill. ** Activity 2, Credits 0 (Fall, Spring)

WINT-062 Adirondack Hiking/Snowshoeing

Come hike some of the most beautiful trails the Northeast has to offer in the largest park in the country. This class consists of a mandatory pre-trip meeting followed by a weekend trip to the Adirondack State Park. The weekend will consist of day-hikes and overnights in lodge-style accommodations. Skills introduced include: trail hiking, map reading, route finding, and leave No Trace Wilderness Ethics. Snowshoes will be used in winter conditions. Participants should possess boots/shoes for hiking/snowshoeing as well as clothing appropriate for the wilderness and seasonal conditions. Proof of health insurance is required to take this course. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WINT-063 Intro Winter Camping

Explore the winter forest with your home in your pack. Sleep in tents or lean-to's, cook on camp stoves and hike or snowshoe the trail. Class will focus on the essentials of winter backcountry camping: planning, communication and execution. Learn to read the weather, pack for the cold and build fires. No previous experience is needed and beginners are welcome. This class will teach and follow the seven Leave No Trace principles. Students must be able to hike several hours while wearing a thirty-pound backpack. Participants should possess boots/shoes for hiking as well as clothing appropriate for a winter, wilderness environment. Proof of health insurance is required to take this course. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity 2, Credits 0 (Fall, Spring)

Recreation and Wellness

WINT-065

Beginning Cross Country Skiing

Learn to cross-country ski and develop the basic skills needed to move efficiently across flat to hilly terrain (cross country skiing is different than downhill/alpine skiing). Designed for beginners, this class will focus on developing the classic diagonal stride, which is the main technique used by skiers to rhythmically propel themselves. Other skills taught will include stopping, turning, and climbing. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WINT-068

Rock Climbing/Technical Skills

This class is designed for those with some outdoor climbing experience. The class will be taught inside, but in simulated outdoor situations, covering such skills as anchor building and management; various belay methods and considerations; belay escapes and basic rescue skills; mechanical advantage and hauling systems; and, above all, safety and its many components in the climbing discipline. Climbing movement will only be covered inasmuch as it pertains to rope work and other technical considerations. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity 2, Credits 0 (Fall, Spring, Summer)

WINT-070

Intro to Snowboarding

This class will focus on the skills and culture of Snowboarding. You can expect to learn all the basic skills necessary to enjoy this sport at practically any ski and snowboarding resort. Each class will deal with at least one component of each: history, equipment, technical skills and language, on-hill etiquette and safety. This class will meet both in the classroom and out on the hill. Proof of health insurance is required to take this course. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WINT-075

Ice Climbing

Learn to scale frozen waterfalls! This class is designed to teach basic ice climbing skills including belaying, ice tool & crampon use as well as special skills & safety considerations particular to climbing on ice. This class will involve pre-trip meetings followed by day trips to local frozen waterfalls for climbing. This class is appropriate for all experience levels and all necessary gear & equipment is provided. Proof of health insurance is required to take this course. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WINT-076

Ice Climbing Adirondacks

Ice Climbing/Adirondacks is an introduction to ice climbing. The class will begin with a required pre-trip meeting followed by a weekend trip to the Adirondack State Park for a weekend of climbing. Skills covered will include: Proper & effective use of crampons including front-pointing and "French Technique", ice tool techniques, belays and rope work, & general winter preparedness. This class is open to all skill levels. Proof of health insurance is required to take this course. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WINT-085

Wilderness First Aid

Whether you are an outdoor enthusiast, a trip leader, or just want to be better prepared to prevent and deal with accidents and emergencies in the wilderness, Wilderness First Aid is a must-have. This course uses both lecture and hands-on practice to provide a solid foundation in the basics of backcountry medical care. Areas of focus include response and assessment, musculoskeletal injuries, environmental emergencies, survival skills, soft tissue injuries, and medical emergencies. No previous medical training is necessary. WFA certification is good for two years. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring, Summer)

WINT-086

Wilderness First Responder

Wilderness First Responder is the perfect course for anyone working in a position of leadership in an outdoor setting or for individuals who want a high level of wilderness medical training for extended personal backcountry trips or expeditions. This is an 80-hour certification-granting course that involves a comprehensive and in-depth look at the standards and skills of dealing with emergencies in the backcountry. This includes response and assessment, musculoskeletal injuries, environmental emergencies and survival skills, soft tissue injuries, and medical emergencies. Students will learn about body systems, anatomy, and physiology as well as elevated standards and protocols for backcountry care including skills for bivouac and extended patient care, methods of emergency evacuation, advanced splinting techniques, long-term wound care, and organized incident response. Passing written and practical examinations will grant students a WFR certification that is valid for three years. This class will involve both classroom lecture and practical exercises that will take place outside in varying weather conditions. *Note: No previous medical training is required. See Course Notes for class meeting times and locations. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity 2, Credits 0 (Fall, Spring, Summer)

WINT-091

Slacklining

Slacklining involves walking while balancing along a narrow, flat piece of nylon that is strung taut between two anchor points. This class will teach tips and techniques for both becoming proficient at slacklining as well as how to set up a slackline. As students become comfortable with basic skills, various additional tricks and challenges will be introduced. Slacklining is, in itself, a fantastic activity for improving balance, focus and kinesthetic awareness and also serves as effective cross-training for many other activities that depend on these capabilities. *Note: See Course Notes for additional details on class meeting times. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WINT-092

Stand Up Paddleboard Yoga

Stand Up Paddleboarding (SUP) Yoga unites the sport of SUP, an offshoot of surfing that developed in Hawaii, with the ancient practice of yoga. In this class, students will learn the art of performing yoga poses and techniques while on an SUP in still water. Practicing yoga on a surface that is less stable, like the paddleboard, engages the core and strengthens other muscles which may be neglected in on-land activity. This also requires intense focus, mindfulness, and intentionality to transition between poses while keeping the board steady. Those with more yoga experience will have the opportunity to practice the "beginner's mindset" as even well-practiced poses and routines become new when performed on a floating surface. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity 2, Credits 0 (Fall, Spring, Summer)

WINT-093

Planning Adventure Journeys

This online class will explore the many stages and components of planning adventure-based trips, from concept inception to research, plan development, revisions and self-reflections. This class is relevant for all levels of wilderness travel, from half-day trips to multi-week expeditions in both remote and accessible locales. Students will learn about a variety of topics including, objective & itinerary planning, team communication and dynamics, nutrition and meal planning, equipment and supply logistics, budgeting, leave no trace ethics, climate and terrain variables and risk management planning. This is a self-paced course, pairing online learning activities with critical thinking, writing, discussion, and instructor feedback. Each student will work on a unique plan based on their experience and goals, developing and writing individual components which will form a complete plan by the end of the semester. Activity 2, Credits 0 (Fall, Spring)

WINT-095

Sustainable Living

This class will explore the basics of sustainable living. Students will be introduced to the UN Sustainable Development Goals and how these goals relate to personal wellness and well-being. The course format will include brief presentations on sustainable alternatives to common everyday products, followed by hands-on Do-It-Yourself (DIY) activities for these items. Products may include beeswax wrap, cleaning supplies, personal care products, tote bags, and others. Students will conduct research on and share at least one aspect of sustainable living that is meaningful to their own personal wellness. Activity 2, Credits 0 (Fall, Spring)

WINT-096

Sustainable Sustenance

This class will explore the concept of sustainability as it relates to food and food systems. Students will be introduced to the UN Sustainable Development Goals, and learn how these goals relate to food production, consumption, and waste. Students will explore the concepts of regenerative farming, sustenance farming, sustainable fishing and fisheries, and community supported agriculture. The course format will include brief presentations and hands-on Do-It-Yourself (DIY) activities. Students will conduct research on and share one aspect of sustainable foods that is meaningful to their own personal wellness. Activity 2, Credits 0 (Fall, Spring)

Lifetime Recreation Activities

WREC-001

Archery

This course is designed to present the lifetime recreational activity of archery in a broad perspective for future use as a recreational and /or competitive pursuit. A major objective of the course is to develop strength in the upper back, neck and shoulder girdle. Students will be presented with the proper shooting techniques and forms. Instruction in the proper selection, use and care of archery tackle (equipment) will be provided. Students will be introduced to the rules, safety, etiquette of archery and archery competition. Once the fundamental skills have been well mastered, students will participate in a variety of class competitions (field, American, hunter, golf, clout, and flight.) Equipment provided by RIT. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WREC-004**Badminton**

Most people regard badminton as a gentle, noncompetitive, backyard diversion for relaxing summer afternoon play. However, the best setting has been found to be indoors or a breezy court. Here the shuttle cock ("birdie") can zip back and forth under great control and amazing speed: It becomes a very exciting game! Because it is physically/mentally demanding, it is one of the most invigorating and challenging sports in the world. It is also a great reducer of stress/ tension and a wonderful muscle-toning activity. For the competitive person, badminton offers limitless opportunity to develop skills and for others, a wonderful recreational activity. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.**
Activity, Credits 0 (Fall, Spring, Summer)

WREC-005**Advanced Badminton**

The class is designed for students who have very strong background and skills in the game of badminton. This course would be most suitable for students who are prepared for a competitive experience that will include tournament play. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.**
Activity 2, Credits 0 (Fall, Spring)

WREC-006**Pickleball**

Pickleball is a sport described as a combination of ping-pong, tennis and badminton. It is an intense work out, very social and athletic as well as competitive game. It is typically played on a badminton court with a net that is lowered to 34 inches in the middle. Players use a baseball sized wiffle ball and a paddle, similar to a large ping-pong paddle, to volley the ball back and forth to score on the opposing team. People of all athletic abilities can play this sport because it is easy to learn. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.**
Activity 2, Credits 0 (Fall, Spring)

WREC-007**Basketball**

This course is designed for beginner-advanced male and female students. It is designed to emphasize basic skill development and refinement, team competition and tournament play. Students will be encouraged to develop individualized skills of the game of basketball: Passing, shooting, dribbling, rebounding, offensive and defensive movement techniques. Objectives of the course are to enjoy playing the game of basketball/team competition, physical conditioning enhancement, to become more informed as to the strategies of the game and to benefit from the sociological aspects of becoming involved with a team sport. The general format of each class will include a warm-up, basic and advanced drills and in class competitions. *Note: Students must be dressed in appropriate athletic attire and sneakers. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.**
Activity, Credits 0 (Fall, Spring)

WREC-008**Advanced Basketball**

This course emphasizes continued development of skills necessary to participate in competitive basketball at an advanced level through game play and drills. Students interested should have experience as a former player. The course will examine strategy, positions, skill development, individual improvement strategies and team cohesion. Part of this curriculum will be devoted to basketball officiating. **A course fee applied via SFS bill. **
Activity 2, Credits 0 (Fall, Spring)

WREC-009**Racquet Sports**

This course is an introduction of three racquet sports: Badminton, Tennis and Pickleball. Badminton is a game played on a rectangular court by two players or two pairs of players equipped with light rackets used to volley a shuttlecock over a net that divides the court in half. Tennis is a game played by two or four players on an indoor or outdoor court. Pickleball is a fast growing sport described as a combination of tennis, table tennis, and badminton. It is typically played on a badminton court with a net that is lowered to 34" using a wiffleball and paddle. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.**
Activity 2, Credits 0 (Fall, Spring)

WREC-016**Pocket Billiards**

"Pocket Billiards" is enjoyed by many of all ages and of all levels of proficiency and skill. The purpose of this course is to develop the fundamentals of a sound game. Emphasis is placed on stance, grip, bridges, stroking and aiming. Other topics introduced are: Stop shots, follow, draw, "english", position play, banks, caroms, combinations, eliminations, break shots and safety play. Games taught and played are: 8-Ball, 9-Ball, Straight (14.1) and Cutthroat. Each class period is divided into three segments: Lecture/demonstration/practice and play. All equipment is provided by RIT and no previous experience is necessary for beginner's sections. 24 student limit. *Note: Meets in the SAU game room. Advanced sections offered. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.**
Activity, Credits 0 (Fall, Spring)

WREC-017**Advanced Pocket Billiards**

Advanced Pocket Billiards can be enjoyed by many of all ages who have had a background in basic pocket billiards and want to take their skills to the next level. The purpose of this course is to refine the pocket billiards fundamentals one already possesses and obtaining advanced billiards skills. Emphasis is placed on refining stance, grip, bridges, stroking and aiming and learning advanced techniques. . Additional topics that will be refined are: Stop shots, follow, draw, "English", position play, banks, caroms, combinations, eliminations, break shots and safety play. Games taught and played are: 8-Ball, 9-Ball, Straight (14.1) and Cutthroat. Each class period is divided into three segments: Lecture/demonstration/practice and play. This course also will have a competitive tournament to crown the Advanced Pocket Billiards Champion and prepare students for advanced tournament play outside of RIT. *NOTE: All equipment is provided by RIT and strong background experience is required. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.**
Activity 2, Credits 0 (Fall, Spring)

WREC-019**Bowling/off-campus**

This course is designed for beginner, intermediate/advanced students who wish to participate in the lifetime recreational sport of bowling. The course is designed to practice the basic techniques of bowling and covers the following: Stance, push-away, back swing, approach and release (fundamental skills of the game). Students will learn the importance of proper ball selection and care of equipment (balls, shoes, gloves). The class will be presented with the rules and etiquette of the game. Once averages have been established, students will be placed on teams and will bowl as a competitive league (format) for the remainder of the term. Course held off campus at Bowl-A-Roll Lanes, 1560 Jefferson Road in Rochester, NY. *Note: Directions in the SLC Lobby. RIT does not provide transportation but car-pooling does exist. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.**
Activity, Credits 0 (Fall, Spring)

WREC-022**Diving**

This course is designed to accommodate all ability levels. The fundamentals of diving will be covered early in the quarter. Students will progress to the next ability levels at their own pace and with the guidance of the instructor. The course objectives are: To teach basic diving safety, fundamentals of diving, to build skill level and develop confidence to as high a point as possible. Course content includes the following areas: Approach, take off, aerial positions, twists and entries. Students must be reasonably coordinated, with average strength and have a basic swimming competency (should be comfortable in deep water). *Note: Materials needed: Swim suit and towel. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.**
Activity, Credits 0 (Fall, Spring)

WREC-025**Introduction to Fencing**

Introduction to the sport of fencing, covering all three blades: foil, epee, and saber. Objectives include basic proficiency with footwork, blade work, abiding by the rules of the sport and following safety procedures, experiential learning through bouting and the opportunity to direct (officiate) for one another. Classes begin with a light warm-up, followed by stretching and conditioning exercises. After the day's topics have been introduced and practiced, the class typically concludes with fencing bouts. Grading is based on attendance and skill evaluation. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.**
Activity 2, Credits 0 (Fall, Spring)

WREC-031**Fresh Water Fly Fishing**

This course introduces students to fly fishing skills which includes identifying trout species, understanding trout behavior and trout habitat, basic entomology and hatch calendar, recognizing common artificial wet and dry patterns, tying wet and dry fly patterns, viewing some popular trout streams in the northeast and western United States, and reading stream conditions. This course includes hands-on sessions for fly casting techniques. Equipment is provided for students who need it (rod, reel, leader material and flies). Class meets weeks 7-14 of the with the last class meeting off site at the same regular class time. RIT does not provide transportation. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.**
Activity 2, Credits 0 (Spring)

WREC-034**Flag Football**

Flag football offers a chance to experience football at its best. Sport equipment will be provided. Individual skills combine in an atmosphere of teamwork, goal attainment, leadership awareness and excitement. Skill presentation, demonstration, drill work and play allow students of all levels to benefit from flag football activity involvement. Passing, catching, flag techniques, offensive/defensive play, creativity, kickoffs, point after attempts, handoffs and rule review will highlight the course. Active participation progresses fitness levels in many areas. Flag football will be offered at various times throughout the school year (depending on instructor/ facility availability). **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.**
Activity, Credits 0 (Fall, Spring)

Recreation and Wellness

WREC-035

Yard Games

Yard games are usually those activities enjoyed while picnicking with family and friends. For many, they are both the first and last physical games in life that can be learned, enjoyed, and played skillfully; where old can compete evenly against young; where the physically challenged can take on the physically gifted; where finishing second is as enjoyable as winning. RIT Yard Games is mixed program with an Olympic-style format. A smorgasbord of activities will go on simultaneously in one location, either indoors or out depending on weather. Kan Jam, Corn Hole, the Washers game, Ladder golf/ball, and Bocce will be the core activities for all classes, while Badminton, Pickleball, and other miscellaneous tossing games will be included indoors. Students will have the opportunity to enjoy at least three different games per class, with both chosen and new partners. The history and rules of each game will be presented, and students will be able to keep personal-best records while evaluating the enjoyment and challenge factor of each activity. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity 2, Credits 0 (Fall, Spring)

WREC-037

Dodgeball

Re-live the glory days of summer camp and middle school by taking part in one of the fastest growing activities on college campuses across the country. Dodgeball is a great way to exercise, relieve stress and most importantly-have fun! This course will focus on the recreational game of Dodgeball as it is sanctioned by many leading organizations such as: The World Dodgeball Association (WDA), The National Amateur Dodgeball Association (NADA), the International Dodgeball Federation (FDA) and the National Dodgeball League (NDL). Students will play the game of Dodgeball using different rules, formats and balls, court and team sizes. This will be an intense, competitive class but with a relaxed, open environment that will accommodate all ability levels. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WREC-040

Ultimate Frisbee

Ultimate Frisbee is a non-contact disc sport played by two teams of 7 players. The object of the game is to score goals. A goal is scored when a player catches any legal pass in the end zone of the opposing team. The disc (frisbee) is advanced by throwing or passing it to team mates. The disc may be passed in any direction. Any time a pass is incomplete, intercepted, knocked down, or contacts an out of bounds area, a turnover occurs. A turnover results in an immediate change of team possession of the frisbee (disc). Students will learn the rules, basic throws and strategies of this exciting game while developing levels of physical fitness. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WREC-047

Golf

Beginning golf familiarizes the student with basic principles of technique, rules, etiquette, equipment and various course layouts. Players will benefit from play alongside novice and experienced level players. Unique individual critiques, etiquette discussion, grip coverage, stance, posture and swing planes are learned, as well as use of irons, woods and putters. When appropriate, videotaped presentations are shown. Stretching, technique demonstration and review combine with various club hitting practice to fill fifty minutes of experiential golf education. Professional presentation delivery and breadth of information in combination with practice, lead to continuous improvement. Written examination tests learning levels performance, as well as a self-performance videotape. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WREC-050

Horseback/English

Student equitation skills, horse control, walking work, the trot and canter develop within this beginning Horseback/English course. Moving on to higher level intermediate and advanced courses, students learn fence jumping and fence course introduction, while further refining equitation skills. Course objectives include riding and stable safe work techniques, developing correct positioning, riding control and specifics dealing with a variety of horses and presented situations. Ground work education such as horse stall exiting, ground leading and correct mounting procedures along with walking, sitting, posting and two-point positioning, walking without stirrups, trotting and cantering lead into intermediate skills. *Note: Must call Huntington Meadows Stables to set up lesson times (872-6286) or email rboucard@rochester.rr.com. Leave phone number and email! **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WREC-053

Horseback/Western

Enjoy scenic trail riding while learning how to safely work and communicate with western trained horses at Liberty Stables in Bloomfield, NY. This class includes weekly discussions/rides. Designed with the novice in mind, students will learn to ride at a walk, trot, and canter. However, the variety of 15 lesson horses allow for varied experience levels. Class discussions/demonstrations include ground and riding safety, basic care/maintenance of horses as well as a bit of history of the human/horse relationship over the past 3000 years! With 80 beautiful acres of rolling countryside, open fields and forested areas as well as outdoor/indoor lesson rings, you are sure to develop your riding foundation. Attendance is key to success in this class. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring, Summer)

WREC-059

Ice Hockey

This course is designed for beginning to advanced ice hockey players. Students must provide their own skates, helmet with full face cage, hockey stick and gloves. Course objectives: To learn the basics of equipment, safety, skating acceleration, stick handling, skating agility (forward and backward), and basic drills. The advanced classes (POWER SKATING) are NOT for beginners! These classes will cover advanced hockey skills, including: Shooting, passing for accuracy, advanced drills, defensive zone coverage and competitive play. If the class is above average in ability, a session on Power Plays and Penalty Kills may be added. There is NO body checking allowed in class. All penalties during class will be penalty shots. *Note: Students must have their own skates and full equipment including a full face guard and helmet, gloves and full pads. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WREC-060

Hockey Power Skating

Hockey power skating will teach you quicker starts, stops, speed, transitions, and power. The course will focus on sharpening your stride, body positioning, and quickening movements. Participants will become a more confident and fluid player. Proper skating technique will be stressed to achieve the above goals. Skaters should have a basic ability to skate forwards, backwards and stop properly. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity 2, Credits 0 (Fall, Spring)

WREC-062

Beginner Ice Skating

This course is designed for beginner-advanced ice skaters. Instructional emphasis will be placed on safely learning the life-long activity of ice skating. Early in the Semester, students will be introduced to aspects of basic use and care of equipment and safety implications. Once basic skills have been obtained, students will progress as follows: Gliding and snow plough stop; forward glide and sculling; backward glide and sculling; forward cross-overs; short jumps/turns; two foot spins; forward chasses; Killian hold; backward chasses waltz hold; foxtrot hold; forward drag, bunny hop and lunge; forward arabesque; combination jumps and spins; Sal chow and basic program development. *Note: Students may use their own skates or can rent skates at the rink (\$3.00). **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WREC-063

Intermediate Ice Skating

This course is designed for those with some ice skating experience, wishing to further develop and refine skills in figure and power skating. Instructional emphasis will be placed on advancing skills and developing balance, agility, efficiency and power, with a focus on body position, core organization, and proper mechanics. Skills covered will include forward and backward power stroking, edge control and footwork phrases, advanced forward and backward cross overs, hockey stop, turns, transitions and entry level jumps and spins. Instruction can be differentiated to suit hockey based power skating skills and figure skating. Working within the format of group lessons, each skater will receive support suitable to their level of skating while challenging themselves to progress. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity 2, Credits 0 (Fall, Spring)

WREC-065

Juggling

This course is designed to acquaint students with the art of juggling in theory and practice while at the same time conditioning their minds and bodies. Course concentrates on 3 and 4 ball juggling patterns and is geared to accommodate all levels of learners. Instructor will teach one-on-one as well as group demonstration. Clubs, rings, combination cigar boxes, scarves, club swinging and 5 ball juggling will be taught (where appropriate to advanced students). Personal instruction will be supplemented with juggling movies, literature and video taping. The goal of the course is not only for each student to achieve maximum juggling ability, but also to increase their mental concentration and physical coordination. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WREC-068

Racquetball

Racquetball is designed to teach skill development from beginners to advanced level players. Focus for the beginner is on skill development and refinement, while intermediates to advanced focus on perfecting the strokes and competitive strategies. Activity level is high. Students will have the opportunity to develop overall fitness elements. The basic course objectives are: skill understanding, enhancement of the social/emotional components, CV fitness, basic shots, equipment, warm up/cool down, training and game strategies. This course meets 1-2x week in the SLC racquetball courts. *Note: Racquets and balls are provided. Eye guards are required and may be purchased locally. All students must bring their RIT ID to every class. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WREC-071 Skiing and Snowboarding Lift Ticket and Equipment Rental

This course is offered at Bristol Mountain Ski Resort on Tuesday evenings from 5 pm-9pm. Bristol Mountain is located at 5662 Route 64, Canandaigua, New York, 14424, <http://www.bristolmountain.com>. *Note: This ski pass is valid only on the designated Tuesday evenings (TBA). This course is designed for those who need to rent equipment that includes rental of skis, boots, poles, snowboard and helmet and also includes a lift ticket. A mandatory meeting will be held for all participants on Tuesday (late evening) during the first week of the Semester (Date TBA-see course notes). Please note that ski helmets are mandatory for participation in this class. RIT does not provide transportation however car-pooling is encouraged and will be discussed at the required pre-class meeting. **Fee: A course fee applied via SFS bill and per Bristol Mountain. See Course Notes for course fee information. The price of this course includes rental of Skis, Boots, Poles or Snowboard, helmets and lift tickets. ** Activity, Credits 0 (Spring)

WREC-072 Skiing and Snowboarding Lift Ticket Only

This course is offered at Bristol Mountain Ski Resort on Tuesday evenings from 5 pm-9pm. Bristol Mountain is located at 5662 Route 64, Canandaigua, New York, 14424, <http://www.bristolmountain.com>. *Note: This ski pass is valid only on the designated Tuesday evenings (TBA). A mandatory meeting will be held for all participants on Tuesday late evening during the first week of the Semester (TBA-check course notes). Please note that ski helmets are mandatory for participation in this class. RIT does not provide transportation however car-pooling is encouraged and will be discussed at the required pre-class meeting. **Fee: A course fee applied via SFS bill and per Bristol Mountain. See Course Notes for course fee information. The price of this course includes lift ticket only, not equipment or helmet rental. ** Activity 2, Credits 0 (Spring)

WREC-073 Soccer

Soccer, the sport of all the world, is a game of constant action. Each player involved in this game must be able to perform as an individual, as well as be an essential part of team play. In this class, we will cover fundamentals of ball control, trapping, dribbling, passing, heading, shooting, defensive (zone, man-to-man) techniques, offensive techniques, goal keeping and soccer terms. In this class, we will also discuss how every team is comprised of individual skill, group skill and team tactics. Class format will follow a warm-up session with skill practice, instruction for the day, along with mini-games in a controlled scrimmage situation. Winter offering will be indoors. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WREC-074 Futsal

Futsal is a modified form of soccer played on an indoor court with boundaries. It is different than indoor soccer because indoor soccer is played on a turf field with walls. The players in futsal are more likely to develop their foot skills without relying on a wall for support. The rules are slightly different than traditional soccer such as there are no throw-ins, just kick-ins. The main difference is the ball is weighted and a size 4, slightly smaller with bounce restriction. This game is played with only 5 players on each side. Having a slightly smaller ball with less bounce allows for a much faster game which will increase foot skill speed and reaction time. Players contact the ball more, and improve their quick, short passes. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity 2, Credits 0 (Fall, Spring)

WREC-076 Softball: Slow Pitch

Co-ed activity class designed for beginner to advanced players of the game of slow-pitch softball. Class will meet outdoors on the turf field or IM field, weather permitting. During inclement weather, class will meet in Clark gym, and play a modified game of softball: Mush- ball. Course consists of basic fundamentals of slo-pitch softball, with "speed up" rules of 3 balls and 2 strikes; including rules, out- field play, infield defensive skills, hitting, pitching techniques, base running, basic game strategies and umpiring. *Note: No metal spikes will be allowed. First class: Meets indoors and consists of orientation session and instruction regarding rules of the game. Most other classes: Outdoor drills and skill refinement. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WREC-079 Swimming/Beginners Only

Participation, enjoyment, improvement, knowledge, fitness conditioning and safety, class shares the latest swimming information and techniques. Course procedure includes individual and group instruction. Objectives involve work on skill improvement, safety development, all stroke recommendations, endurance improvement and swimming enjoyment. Course content delivers beginner, intermediate and advanced swimming skill work, freestyle, side, back, breast, fly and elementary back- stroke. In addition to turns and variation, water orientation and entry, stroke mechanics, understanding fitness conditioning, games, diving and safety skills, students explore water enjoyment. *Note: This is strictly a "beginner's" class. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring, Summer)

WREC-080 Intermediate Swimming

This class will take students with beginner swimming skills and knowledge to the next level by introducing and practicing all four of the competitive Swimming strokes (front crawl, back crawl, breaststroke, butterfly). These strokes will be practiced and refined in the lap pool formation. Basics of starts off the blocks, flip turns and treading water will be introduced, practiced and refined. Students will progress from lap swimming of these competitive strokes to swimming for fitness by the end of the term. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity 2, Credits 0 (Fall, Spring)

WREC-081 Water Polo

Water Polo is an exciting, fast-paced game that incorporates athletic elements from soccer, basketball, football, rugby, wrestling, and swimming. Participants will learn basic skills and strategies including ball control, game plays, passing, set-up, and shooting. Course will begin with basic swimming head-up freestyle, swimming with the ball, and treading water with and without the use of hands. After the instruction of fundamental skills, participants will learn game set-up, plays, offensive and defensive skills. Participants must be comfortable in deep water. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity 2, Credits 0 (Fall, Spring, Summer)

WREC-082 Tennis

Participation, enjoyment, and lifetime game appreciation fulfill class expectations. Introduction to beginning fundamentals and skills will be covered. Objectives of the course reflect upon: game skills, rules, etiquette, tennis appreciation, and attaining a level of play that allows competition with comparable players. Court layout, surfaces, scoring, equipment, individual skills (forehand, backhand, serve, the volley, overheads) and footwork allow progression into preliminary games and round robin play. *Note Indoor Tennis periodically are now offered in the Winter/focuses on tennis drills aimed at increasing cardiovascular strength/breathing and advanced footwork. Students will do circuit training, court positioning and continuous feeding drills. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring, Summer)

WREC-083 Tennis: Intermediate-Adv.

This course is designed for students who have a fairly strong background in the sport of tennis and are interested in taking their skills to the next level. There will be a brief review of tennis fundamentals and skills but class will move quickly to more advanced drills and competitions. Objectives of the course focus on: challenging game skills, review rules (singles and doubles), review etiquette, and attaining a high level of play that allows for competitive tournament play and matches. Students should have a strong background in tennis court layout, surfaces, scoring, equipment, and strong individual skills (forehand, backhand, serve, the volley, overheads) to easily enter class competitions. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity 2, Credits 0 (Fall, Spring, Summer)

WREC-085 Volleyball

This course designed for all levels of players of the lifetime recreational and competitive game of volleyball. Course evaluation is based on attendance, effort, improvement and enthusiasm. The basic course outline includes instruction and rehearsal of basic volleyball skills (under hand pass, over head pass, spike and serve); rules; basic formations/ positions/strategies; and tournament play. Students will have ample time to practice/refine basic-advanced skills of the game. Tournament play will take place in the form of a random team selection from class to class. *Note: Students should dress in athletic wear, with comfortable sneakers and knee pads (if desired). Advanced section offered periodically. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

WREC-086 Wallyball

Wallyball is a fast-paced sport that combines skills from handball, tennis and volleyball. It is played on a racquetball court with a volleyball sized rubber ball with 2 or 4 players per side. The concepts are similar to volleyball but with an element of surprise because players can hit or spike the ball off of the side walls. This sport will test your hand-eye coordination, balance, strength, power and agility. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity 2, Credits 0 (Fall, Spring)

WREC-091 Table Tennis

Table tennis is the 2nd most popular sport in the world. It is a sport played by all ages. At the beginner level it is recreational. At the top level, it is a world class sport requiring years of dedication and top notch training/fitness! It combines technique, speed, spin, power, touch, smarts and concentration. Course content includes: basic strokes, footwork, drills, strategies and rules. Games and matches will also be played, based on practice drills, and then a tournament near the end of the quarter. All equipment is provided. *Note: Must wear sneakers. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** Activity, Credits 0 (Fall, Spring)

Recreation and Wellness

WREC-092

Advanced Table Tennis

Table tennis remains the 2nd most popular sport in the world. At the beginner level it is recreational. This course is designed for players with a strong table tennis background who want to play the sport at a higher level. Basic skills will be briefly reviewed, while advanced techniques will be introduced early on. At the top level, this is a world class sport requiring years of dedication and top notch training/fitness! An advanced player must be easily able to combine technique, speed, spin, power, touch, smarts and concentration. Course content includes: Reviewing basic strokes, footwork, drills, strategies and rules but then delving into advanced techniques early on and begin competitions. Competitive games and matches will regularly be played, and then a high level tournament will take place near the end of the term. *Note: All equipment is provided, but students must wear sneakers. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring)**

WREC-093

Competitive Table Tennis

This course is designed for players with a strong table tennis background who are interested in advancing their skills to the next level. Students will learn how to combine technique, speed, spin, power, touch, and concentration to gain individual improvements by the end of the semester. ** A course fee applied via SFS bill. **Activity 2, Credits 0 (Fall, Spring)**

WREC-094

Curling

This course will focus on the Olympic sport of curling. Curling is a competition between two teams with 4 players each. The game is played on ice, and the teams take turns pushing a 19.1kg stone towards a series of concentric circles. The object is to get the stone as close to the center of the circles as possible scoring more points than the opposing team. Instruction will cover all rules, equipment, safety, basic-intermediate skills and competitions. *Note: All classes will meet off campus at the Rochester Curling Club on 71 Deep Rock Rd. (11 minutes from campus). RIT does not provide transportation. For directions call 235-8246 or www.rochestercurling.com. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Spring)**

WREC-098

Team Handball

The verbal similarity between team handball and the more familiar "handball" played in a small court causes much confusion when talking about the game of team handball. The similarity of the 2 sports stops with the name. Team handball is played on a court like Basketball. Each team has 7 players-six court players and a goalie that plays both offense and defense. The basic objectives are to throw the ball into the goal of the opposing team and to defend one's own goal against attacks by the other team. Team Handball is a rapid, continuous play type of activity. Students will learn the rules, throws and basic strategies of the game while at the same time develop cardiovascular fitness levels. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

Martial Arts

WMAR-001

Karate

Course designed to help students increase their stamina, flexibility and basic techniques in self-defense. Main course objectives: become more physically fit to enhance self-esteem; develop self-confidence to help students deal with everyday situations; relieve stress by providing an outlet to "blow off steam"; and to gain self-discipline to enable students develop better study, work and life habits. Course content: calisthenics; stretching; upper body/lower body exercises; kata (a prearranged set of movements which deal with being attacked). **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WMAR-005

TaeKwonDo

This course is designed to teach the physical, mental, and philosophical aspects of TaeKwonDo. Students will learn self-defense motions through kicks, strikes, and blocks. The history and philosophy of this ancient art will be discussed along with the modern Olympic sport aspect. This class will be taught using a variety of drills and exercises designed to condition the mind and body. Targets, shields, and boards will be used in practice. Tae Kwon Do is the art of self defense that originated in Korea. It is recognized as one of the oldest forms of martial arts in the world, reaching back over 2,000 years. The name was selected for its appropriate description of the art: Tae (foot), Kwon (hand), Do (art). **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring)**

WMAR-006

Self Defense

This empowering self defense course, designed for students is designed to help students increase their stamina, flexibility, and basic fundamental techniques needed to feel confident in the ability to protect oneself. In this positive, non-threatening environment, the class will teach proper use of hands and feet as weapons, how to fend off multiple attackers, as well as techniques that can be used against a person with a knife, gun or club. Main course objectives: become more physically fit, enhance self-esteem and gain necessary awareness of potential dangers, develop confidence and self-discipline to help deal with everyday situations, relieve stress, provide resources needed to develop better study, work and life habits. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WMAR-011

Kali Level I

This course is a study of Filipino Indigenous Martial Arts used in Pre-Hispanic colonial periods of the Philippines known as Kali, Arnis and Eskrima. The practice of this art was trained in the guise of cultural dances and theatrical plays to hide the Martial applications from the colonial powers. This course will explore the system's unique training method that begins with weapons and transfers the same movement to empty handed defensive applications using a 3 dimensional thought provoking process of deciphering and understanding body mechanics. Class includes skills through the use of double/single sticks in place of blades and use of these tools to develop plyometric and 2 man dynamic drills. *Note: Students must have their own rattan sticks (purchasing information is provided by the Instructor). **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WMAR-016

Kung Fu

Kung Fu typical classes are 1-2 hours, depending on the class-where all students work together. Most classes start with exercises, which are followed by the introduction of basic technique and their application. Students' progress throughout the term learning more advanced skills at a workable pace, and gain more self-discipline and confidence. Kung Fu is an excellent method of getting in shape. Students will feel a definite improvement in overall well-being as they develop their offensive and defensive abilities. Students can also learn the philosophy, history and analysis of Kung Fu techniques. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring, Summer)**

WMAR-018

Kung Fu: Advanced

This Kung Fu class allows students to utilize their current skills and obtain more advanced skills to further gain strong self-discipline and enhanced confidence. Kung Fu is an excellent method to change your fitness level and see improvements in overall well-being by developing offensive and defensive abilities. Students will utilize their current knowledge of Kung Fu philosophy, history and analysis to move to the next level of competency and rank. Students should have prior background experience in the basic skills of Kung Fu that will be important in the success at an advanced level. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring)**

WMAR-021

Kung Fu Open Practice

This class is designed to provide extra practice time for students outside of their regular class and to give students the opportunity to receive more individual instruction on techniques they have questions about or feel they need help with. Typically class will run for about an hour and 20 minutes, starting out with a set of warm-up exercises, which will then be followed by a review of techniques or 1-on-1 bouts with a senior instructor present. The format of the class is open, providing the opportunity for previous students to rejoin and refresh on techniques they may have learned several quarters, or years ago. All are welcome to register. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WMAR-031

Kung Fu Self Defense

This self defense class is designed to teach students the physical and mental techniques/attitudes they need to protect themselves both on campus and off. During class students will learn a variety of self-defense applications and techniques that can be used anywhere and in any situation. Over the course of the quarter students will gain an increase in physical fitness, self-confidence, and awareness, which will better enable them to deal with any situations they may encounter - whether walking back to the dorms late at night or walking home to your off-campus apartment, you'll learn how to stay safe and out of danger. The techniques taught in this course will be based in Shaolin Kung Fu. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WMAR-033

Warrior Workout

This class focuses on functional fitness incorporating a variety of martial arts to increase overall conditioning. Whether you have a desire to improve punching, blocking, and kicking or rolling, falling, and ground work, this course can assist in achieving your personal fitness goals. While this class is designed for a wide range of martial arts, it will focus on fitness drills and is suitable for all fitness levels. This class can be taken on its own or as an additional practice session for a student taking any Martial Art. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity 2, Credits 0 (Fall, Spring, Summer)**

WMAR-036

Tai Chi Slow Paced

This course is designed to teach 24 forms of Tai Chi movements with popular meditation ideas. Focus on creating strong internal energy and strength. Pursue and maintain good health, the "qi" sensations. Learn to balance the body with gentle movements that improve health conditions with each progressive section. Tai Chi was created 400 years ago and repeats simple movements again and again in certain frequency, allowing students to develop a special routine for maximal energy, skills and strong internal power for application in defense and self-healing. First time learners are welcomed. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information.** **Activity, Credits 0 (Fall, Spring)**

WMAR-050**Qigong**

This martial arts course focuses on 'internal energy exercise' based on practices from 2000 years ago. The powerful combination of slow movement, breathing, postures and meditation practices allow the body to open energy channels instantly, thus dramatically healing disease that conventional medicine has failed to overcome. Students will focus on using 'health energy' to pursue success, peace and happiness. Basic course content: Flying Crane Qigong (combines movement with mental concentration); Fragrance Qigong (repeats simple movements in specific frequency for maximal biophysical energy); and Qigong Meditation (involves applying physical pressure to transform 'bad' energy to 'good' energy) to heal at a subconscious state. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** **Activity, Credits 0 (Fall, Spring)**

WMAR-056**Aikido**

Aikido was founded by Master Morihei Uyeshiba as a synthesis primarily of Aiki-jitsu, Aikiken, Judo and founder's philosophy of peaceful reconciliation of conflict. One of the founder's students, Koichi Tohei Sensei, founded a branch school called the Ki-Society, which emphasizes the development of personal "ki" through Aikido practice. RIT aikido traces its lineage back to the original Hombu dojo in Japan. The objective of this course is to provide physical conditioning by educating and coordinating the whole body-mind-spirit system. Basic ideas and techniques will be taught. The four basic principles to be presented: 'Keep one-point', 'Relax completely', 'Keep weight under- side', and 'Extend Ki'. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** **Activity, Credits 0 (Fall, Spring)**

WMAR-066**Sparring**

This exciting Martial Arts course is designed to help students increase their stamina, flexibility and basic techniques in self defense, with emphasis on controlled fighting bouts (2 students matching their skills against each other). Main course objectives: develop confidence through physical fitness, relieve tension by providing a healthy forum for stress relief and gain the self discipline to enable students to lead a more productive lifestyle. Course content: calisthenics, stretching, and punching and kicking drills (include bag work and sparring with other students) to promote the development of footwork, distancing timing, focus and strategies needed to be a skillful fighter. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** **Activity, Credits 0 (Fall, Spring)**

WMAR-071**Brazilian Capoeira**

This exciting martial art course is one of the few, if not the only one still in existence, native to Americans, developed in Brazil by the descendants of African slaves brought there by the Portuguese during the era of the Atlantic Slave trade. Capoeira is characterized by dynamic body play, kicking, sweeping, takedowns, aggressive feinting and head butt movements. It is played within a circle of onlookers and fellow participants, called a "Roda". The game is played when two contestants enter the circle and begin to "ginga" ("to swing" in Portuguese), launching various attacks, counters and initiating defense. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** **Activity, Credits 0 (Fall, Spring)**

Military Sciences**WMIL-001****Air Force ROTC Physical Training**

This course is designed to help the individual establish a physical readiness program. "Physical Readiness" are those factors that determine one's ability to perform heavy, physical work and those that help maintain good health and appearance. Factors/components of readiness: muscular strength, muscular endurance and cardio-respiratory endurance. Major goals of the course: To physically challenge students and help students develop self-confidence, discipline and spirit. Students will work to develop physical readiness to a degree that will enable them to achieve or exceed the physical readiness standard established by the U.S. Air Force. *Note: Must be enrolled in RIT ROTC Air Force. * **Activity, Credits 0 (Fall, Spring)**

WMIL-006**Air Force Leadership Lab**

This ROTC course is an Air Force Leadership Lab. Formerly Air Force Physical Training II, this revised course is designed to provide the students with a foundational understanding of the benefits, privileges and opportunities as well as responsibilities associated with an Air Force commission. Students will also be introduced to Air Force customs, courtesies, environment, drill, flight movement and ceremonies. *Note: Must be enrolled in the RIT ROTC Air Force Program. * **Activity, Credits 0 (Fall, Spring)**

WMIL-018**Army Conditioning Drills**

This course is designed to help the individual establish a physical readiness program. "Physical Readiness" are those factors that determine one's ability to perform heavy, physical work and those that help maintain good health and appearance. Factors/components of readiness: muscular strength, muscular endurance and cardio-respiratory endurance. Major goals of course: To physically challenge students and help them develop self-confidence, discipline and spirit. Students will work to develop readiness to a degree that will enable them to achieve or exceed the physical readiness standard established by the U.S. Army Evaluation will be determined by the use of the Army's Physical Readiness Test. *Note: Must be enrolled in RIT ROTC Army. * **Activity, Credits 0 (Fall, Spring)**

WMIL-021**Army Leadership Lab ROTC**

*Note: must have successfully completed Army Conditioning Drills and must be enrolled in RIT Army ROTC. * **Activity, Credits 0 (Fall, Spring)**

WMIL-024**Navy Drill ROTC U of R**

This course is designed to help the individual establish a physical readiness program. "Physical Readiness" are those factors that determine one's ability to perform heavy, physical work and those that help maintain good health and appearance. Factors/components of readiness: muscular strength, muscular endurance and cardiorespiratory endurance. Major goals of the course: to physically challenge students and help them develop self-confidence, discipline and spirit. Students will work to develop physical readiness to a degree that will enable them to achieve or exceed the physical readiness standard established by the U.S. Naval Sciences. *Note: Must be enrolled in University of Rochester ROTC Navy. Call 275-4275 @ U of R for more information. * **Activity, Credits 0 (Fall, Spring)**

Music**WMUS-001****Guitar Ensemble**

This course is designed for beginning guitarists who wish to understand the fundamentals of music and performance through the guitar. Prior instruction is not required. Basic skills such as chord strumming, tablature notation, improvisation, and ensemble playing will be covered. Students are required to have their own instrument. The use of a classical guitar nylon-string is highly recommended for the purposes of this course, but acoustic guitars (steel-string) will be accepted. Upon completing this course, students may continue their studies on the guitar through lessons (FNRT-256). **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** **Activity 2, Credits 0 (Fall, Spring)**

WMUS-002**Steelband Ensemble**

This course is designed for beginning musicians who wish to understand the fundamentals of music and performance through the performance of steel drums. The instructor/band director will instruct students using both western music pedagogy and rote learning techniques that emerge from Caribbean music traditions. In addition to studying instrumental technique and individual band parts, students will learn about the history and development of the instrument from its roots in African drumming, its evolution through found instruments and discarded oil barrels, to its modern form and practice. Prior instruction is not required. **Fee: A course fee applied via SFS bill. See Course Notes for course fee information. ** **Activity 2, Credits 0 (Fall, Spring)**

WMUS-003**African Drum Ensemble**

African Drum Ensemble is a course designed for beginner musicians who wish to understand the fundamentals of music and performance through the performance of African Drums. In addition to learning instrumental technique and individual band parts, student will learn about the history and development of the instrument from its roots in African drumming, its evolution through African history, to its modern form and practice. Prior experience is not required for this course. **A course fee is applied via SFS bill. **Activity 2, Credits 0 (Fall, Spring, Summer)**

WMUS-004**Gospel Ensemble**

Gospel Ensemble is a course for beginning musicians who wish to understand the fundamentals of music and performance through the performance of Gospel music. Students will learn to sing authentic Gospel music within an ensemble setting. Prior instruction is not required**A course fee is applied via SFS bill. **Activity 2, Credits 0 (Fall, Spring, Summer)**

WMUS-005**Play, Sing, Produce**

This course is designed for beginning musicians who wish to understand the fundamentals of music and performance through the performance of American popular music. Students will learn to play and sing within an ensemble setting and learn about modern recording practices and post production practices within a recording room and mixing room. Some previous experience playing or singing is strongly encouraged. **Fee: A course fee applied via SFS bill. **Activity 2, Credits 0 (Fall, Spring, Summer)**