# Rochester Institute of Technology
## 1992-93 Institute Calendar

### FALL QUARTER
- **August 31** Move-in Day for New Residents
- **August 31-September 3** Fall Orientation
- **September 2** Open Registration (New and Returning Students)
- **September 3-5** All Classes Begin
- **September 10** End of Drop/Add Period
- **October 23** Last Day to Withdraw with a Grade of "W"
- **November 11** Last Day Class
- **November 14** Last Saturday Class
- **November 13, 14, 16, 17** FINAL EXAMS
- **November 18** Last Evening Class
- **November 19-29** Fall/Winter Break

### WINTER QUARTER
- **November 30** Open Registration
- **November 30** Evening Classes Begin
- **December 1** Day Classes Begin
- **December 5** Saturday Classes Begin
- **December 8** End of Drop/Add Period
- **December 19** Last Day of Classes Before Break
- **January 4, 1993** Classes Resume
- **February 5** Last Day to Withdraw with a Grade of "W"
- **February 22** Last Day Class
- **February 23-26** FINAL EXAMS
- **February 26** Last Evening Class
- **February 27** Last Saturday Class
- **February 28-March 7** Winter/Spring Break

### SPRING QUARTER
- **March 8** Open Registration
- **March 8** Evening Classes Begin
- **March 9** Day Classes Begin
- **March 13** Saturday Classes Begin
- **March 16** End of Drop/Add Period
- **April 30** Last Day to Withdraw with a Grade of "W"
- **May 17** Last Day Class
- **May 18-21** FINAL EXAMS
- **May 21** Last Evening Class
- **May 22** Last Saturday Class
- **May 22** COMMENCEMENT
- **May 23-31** Spring/Summer Break

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RIT will admit and hire men and women, veterans, and persons with disabilities, individuals of any race, creed, religion, color, national or ethnic origin, sexual orientation, age, or marital status, in compliance with all appropriate legislation.
Course Numbering

In addition to its title, each course is identified by two numbers. The alpha-numeric directly to the left of the course title is the official Institute course number. The number will appear on the grade report, transcripts, and other official correspondence. This is what the alpha-numeric means.

First letter: College offering the course

Second and third letters: School or department of that college

Fourth letter: Discipline

First number: Course level: O-non-credit; 1-Diploma; 2 or 3-Lower level degree courses; 4, 5, or 6-Upper level undergraduate degree courses; 7 or 8-Graduate courses that must be taken to satisfy undergraduate requirements.

Second and third numbers: Course differentiation and sequencing

Directly below the the alpha-numeric in the course description is the registration number. You must use this number with a section number (i.e., 01, 02) when you register for a course, because the alpha-numeric course number cannot be read by the computer system.

Course prerequisites and/or corequisites are shown in parentheses after course descriptions.

Course of Study 1992-1993

Produced by RIT Communications

This book represents the best academic planning at the time of publication. Course and curriculum changes sometimes occur after the book has been printed, and for this reason, Rochester Institute of Technology does not assume a contractual obligation with its students for the contents of this publication.

For information about the colleges and programs at the undergraduate level, please refer to the Undergraduate Bulletin; for further information about the colleges and programs at the graduate level, please request the Graduate Bulletin from:

RIT Office of Admissions
Bausch & Lomb Center
P.O. Box 9887
Rochester, NY 14623-0887
716-475-6631

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Or for information about programs offered through NTID, contact:

Rochester Institute of Technology
National Technical Institute for the Deaf
Department of Career Outreach and Admissions
Lyndon Baines Johnson Building
P.O. Box 9887
Rochester, NY 14623-0887
716-475-6770 (Voice); 716-475-6173 (TDD)
College of Applied Science and Technology

School of Computer Science and Information Technology

School of Computer Science and Information Technology courses are normally offered at least once annually.

Information Technology

Courses are offered in the Department of Information Technology both for students enrolled in one of the programs in the department and for those who are enrolled in other programs at the Institute. Students are advised to take note of prerequisite requirements. Equivalent experience may be substituted for prerequisites upon approval by the department.

ICSA-200 Survey of Computer Science
Registration #0602-200
Survey of computers and problem solving by using general purpose application software. Students will use several general purpose software tools, such as a spreadsheet, database package, word processor, and graphics software to complete a series of required projects. Emphasis is on using software for personal productivity and to enhance effectiveness and communication. Required projects will utilize packages individually and in an integrated fashion. To accommodate students from different majors, each student will pick an area of concentration where further, more advanced and specialized projects will be required.
Class 4, Credit 4

ICSA-210 Freshman Seminar in Information Technology
Registration #0602-210
Orientation seminar for first-year students in the Information Technology curriculum. Areas to be covered include topic overviews and co-op and career alternatives in information technology.
Class 4, Credit 4

ICSA-220 Software Tools
Registration #0602-220
Advanced utilization of general-purpose software tools such as spreadsheets, databases, hypertext, and graphics software. Special emphasis on scripting languages and other high-level programming languages incorporated into these tools. Computer laboratory work will be required.
Class 4, Credit 4

ICSA-205 Computer Techniques—FORTRAN Language
Registration #0602-205
Students will be introduced to computer systems, learn problem solving techniques, and learn to program in the FORTRAN language. Topics available for study include straight line programming, decision and repetition capabilities, input/output, data structuring, and the use of subprograms. Programming projects will be required. (Pre-calculus)
Class 3, Credit 3

ICSA-206 Computer Techniques—BASIC Language
Registration #0602-206
Students will be introduced to computer systems, learn problem solving techniques, and learn to program in the BASIC language. Topics available for study include straight line programming, decision and repetition capabilities, formatted input/output, data structuring, and the use of subprograms. Programming projects will be required. (Pre-calculus)
Class 3, Credit 3-4

ICSA-207 Computer Techniques—C Language
Registration #0602-207
Students will be introduced to computer systems, learn problem solving techniques, and learn to program in the C programming language. Topics available for study include straight line programming, decision and repetition capabilities, input/output, data structuring, and the use of subprograms. Programming projects will be required. (Pre-calculus)
Class 3, Credit 3-4

ICSA-208 Introduction to Programming
Registration #0602-208
A first course in programming using PASCAL in writing modular, well-documented programs. Topics include an overview of problem solving methods, Pascal control structures and their uses, procedures and functions with parameters, elementary data types, arrays, records, and modular programming. The course is organized around weekly programming assignments that stress features of structured programming and Pascal. The assignments may be completed faster than the required rate of one per week. Programming projects will be required. (ICSA-200 or 202)
Class 4, Credit 4

ICSA-210 Program Design and Validation
Registration #0602-210
A second course in programming and data structures, where students use Pascal to implement moderately large programs. Topics include sorting, searching, arrays of records, text files, files of records, multidimensional arrays, recursion, pointers, classic data structures and their implementations (stacks, queues, linked lists, trees), and the application of these concepts to solve problems of intermediate complexity. The role of testing in the validation and acceptance of a program will be stressed. Programming projects will be required. (ICSA-208)
Class 4, Credit 4

ICSA-212 Abstractions in Programming
Registration #0602-212
A third course in programming where the student studies methods of dealing with complexity of large software systems. Abstractions include structured programming, modularity, and object-oriented systems. Software integration and interoperability is the major emphasis. Programming projects will be required. (ICSA-210)
Class 2, Lab 4, Credit 4

ICSA-220 FORTRAN Programming for Engineers
Registration #0602-220
Students will be introduced to computer systems, learn problem solving techniques, and have an opportunity to study the FORTRAN programming language. Topics available for study include straight line programming, decision and repetition capabilities, formatted input/output, data structuring, use of subprograms, and application packages (e.g., plotter routines and the IMSL package). Several classical numerical techniques are illustrated. Programming projects will be required.
ICSA-300  Business Applications Using COBOL
Registration #0602-300
A study of elementary COBOL programming, using structured design and programming concepts developed in ICSP-210. The course will emphasize the use of COBOL in solving common business, commercial, and managerial problems. Topics include COBOL program organization, sequential file I/O, COBOL control structures, arithmetic operations and report editing, control break processing, and table handling. Students will write programs that adhere to specific programming and documentation standards. (ICSA-210)
Class 4, Credit 4

ICSA-303  Advanced Business Applications
Registration #0602-303
An advanced course developing more expertise in the application of COBOL to business and industrial problems. Topics include advanced COBOL constructs, direct and indexed sequential access methods, sorting and searching, and database system access using commands embedded in the COBOL source. Students will write programs which adhere to specific programming and documentation standards. (ICSA-300)
Class 4, Credit 4

ICSA-310  Computer-Human Interface Design
Registration #0602-310
A rapidly expanding and evolving community of computer users has inspired exciting research into the design of computer-human interfaces. Students in this course discuss technique and technology representing current practice plus explore new and experimental directions in the field. Interdisciplinary teams from a variety of backgrounds enhance the scope of this work. Class work will include the design, implementation, and evaluation of interfaces. (ICSA-202, 210)
Class 4, Credit

ICSA-320  Electronic Imaging
Registration #0602-320
The broad bandwidth capability of today's computer workstations makes it possible to store and display high-quality electronic images. Students enrolled in this class will use still video cameras to capture color images. The digitized images will then be incorporated in electronic and paper documents. A variety of techniques will be introduced for image enhancement, transformation, and compositing. Current practice and experimental work in electronic imaging will be discussed. Projects required. (ICSA-202)
Class 4, Credit 4

ICSA-350  Technology Transfer
Registration #0602-350
In spite of the fact that a technological innovation can be designed and produced, it has limited effectiveness if it is not used, or is not used correctly. The area of technology transfer deals with these and other related problems. This course examines change strategies that can facilitate technology transfer. It gives students hands-on experience, through simulations and activities, with the events that can facilitate and hinder change. Students examine case studies to explore the intended and unintended effects that technological change has on systems and participants. (ICSA-202)
Class 1, Credit 1 Class 2, Lab 4, Credit 4

ICSA-311  Data Communications and Computer Networks
Registration #0602-311
An introduction to data communications hardware and software, and use of these components in computer networks. Topics include communication system components, communications software, packet switching, network control, common carrier issues, long-haul vs. local area networks, and performance considerations. (ICSA-208)
Class 4, Credit 4

ICSA-420  Artificial Intelligence: Expert Systems
Registration #0602-420
This course presents a survey of the mechanisms of intelligence and all supporting technologies that provide the infrastructure for the study of cognitive science. This course requires the study of expert systems, including the knowledge base and inference engine required in an expert system. Students will learn Prolog and develop their own expert system in Prolog. (ICSA-210)
Class 4, Credit 4

ICSA-425  Human Factors in Information Processing
This course focuses on the exploration of the nature of the mind, exploring the foundational concepts of cognitive psychology, sensation, perception, attention, knowledge, problem solving, and memory. Cognitive theories will be discussed and related to computer human interactions and the representation of knowledge and information in the computing environment.
Class 4, Credit 4

ICSA-455  Needs Assessment
Registration #0602-455
Complex problems in modern organizations require an information technologist to systematically analyze problem areas to determine the most effective and cost-efficient solutions. This course is designed to build student skills in two different—yet interacting—areas: needs assessment (requirements analysis) and group problem solving. The student will use interviewing and problem-solving techniques to uncover the constraints that surround problem areas. The student will learn the questions to ask during needs assessment, along with developing the interpersonal skills to conduct these meetings. Emphasis is placed on the steps in creative problem solving, the basics of meeting planning to maximize group effectiveness, and helping a client to focus his concerns into a clearly defined problem.
Class 4, Credit 4
ICSA-478 Image and Voice Communications
Registration #0602-475
Provides an understanding of basic telephony and associate image/voice and video-based applications. Topic highlights include audio text, voice mail, digital representations of images, image compression, and ISDN (Integrated Services Digital Network). Practical assignments emphasize "real world" applications. (ICSA-202, 411)
Class 3, Lab 2, Credit 4

ICSA-483 Applied Database Management
Registration #0602-483
An introduction to issues in data management in organizations, and the role of database management systems in addressing these issues. Topics include the uses and needs for data in organizations, review of simple data structures, the influence of computer architecture and I/O devices on the management of data, basic file organizations supporting data management (sequential, direct access, indexed sequential), logical data models and their physical implementation, database administration, and DBMS selection. (ICSA-210 or permission of instructor)
Class 4, Credit 4

ICSA-499 Cooperative Education in Information Technology
Registration #0602-499
One quarter of appropriate work experience in the Information Technology industry. (Third-year standing)
Credit 0

ICSA-510 Fundamentals of Instructional Technology
Registration #0602-510
One technology transfer strategy is to effectively train the end users to run the new technology. Information technologists need to design small to moderately sized instructional programs that can teach skills to end users. This course emphasizes an Instructional System Design (ISD) model of developing instruction. Students will apply the model to a selected topic and develop and validate a unit of instruction for end users.
Class 4, Credit 4

ICSA-534 Dynamic Graphics and Animation
Registration #0602-534
The ability of today's workstations and microcomputers to represent animation in real time has provided users with an abundant vocabulary for visualization and an extended set of metaphors for interaction. This class will survey the use of dynamic graphics in user interfaces and animation in the simulation and visualization of information. Tools and techniques for the production of computer graphics and animation will be introduced, and student projects will be required. (ICSA-202, 210)
Class 4, Credit 4

ICSA-500 Electronic Prototyping and Participatory Design
Registration #0602-500
Participatory design involves the user of an application in the design process, from the initial visualization of a design to evaluation of the final product. Students will apply techniques for rapid prototyping and evaluation to a problem requiring the design of an interactive interface. They will interview users who are familiar with the task and proceed through an iterative process of prototyping and user evaluation to produce a fully functional interactive interface. Students will be required to critique assignments and evaluate prototypes developed by other class members. (ICSA-202, 210)
Class 4, Credit 4

ICSA-525 Performance Support System Design
Registration #0602-525
The modern workplace requires workers to be the center of a large mass of information. Although the information is available, the worker needs to be able to access it quickly in a useful form. Performance support systems involve online job aids, expert systems, data bases, and tutorials integrated into a system that enables a worker to access specific information effectively. This capstone course in the Technology Transfer option integrates skills and knowledge learned in Expert Systems (ICSA-420), Fundamentals of Instructional Technology (ICSA-510), Interactive Courseware (ICSA-512), Technology Transfer (ICSA-350), Participatory Design (ICSA-355), and Interactive Instructional Simulations (ICSA-514). It enables the learner to create, implement, and evaluate an integrated performance support system that meets specific needs within an organization.
Class 4, Credit 4

ICSA-536 Electronic Media Management
Registration #0602-536
The decreasing cost of high-quality computer graphics devices is changing the way people describe, store, and transmit information. Scientists, educators, and the business community are recognizing the power inherent in the graphic representation of information. This course presents fundamental topics in visual design for electronic media. Each topic is presented along with the underlying computer technology that supports it. Interactive media have made possible startling changes in how we think and communicate. New databases offer researchers electronic libraries of images, sounds, and film. Collageability—electronic media's ability to build new images and metaphors through the compositing of existing media—encourages authors and designers to quote existing imagery to create multimedia presentation. (ICSA-483)
Class 1, Credit 1 Class 2, Lab 4, Credit 4
ICSA-550  
Registration #0602-550  
Software Integration and Interoperability  
The study of system integration and the construction of system components designed to provide capabilities for cooperation in the accomplishment of given tasks. Topics covered include inter-program communication and representation of data. Methods of design interoperability will be covered. An introduction to system integration is included. (ICSA-202, 411)

Class 4, Credit 4

ICSA-556  
Registration #0602-556  
Electronic Data Interchange  
The study of an alternative way for companies to conduct business electronically. Topics of study include comparison between paper-based business documents and the electronic equivalent, how companies have sought improvements for the problems inherent to the paper-based method of operation, and how EDI may solve these problems in the future. Additional discussions will focus upon the preparedness of companies for EDI, the planning, implementation of EDI within various industries, and EDI standards. (ICSA-210)

Class 4, Credit 4

ICSA-590  
Registration #0602-590  
Seminar in Applied Computer Studies  
Current topics and advances in applications of computer technology for undergraduate students. (Permission of instructor)

Credit variable 2-4

ICSA-595  
Registration #0602-595  
Senior Seminar in Information Technology  
Capstone seminar to be taken by graduating students in the Information Technology curriculum. Topics to be covered will include recent advances and future impacts in information technology. (Fourth-year standing)

Class 1, Credit 1

ICSA-599  
Registration #0602-599  
Independent Study  
Faculty directed study of appropriate topics on a tutorial basis. This course may be used by an undergraduate student to study particular applications of computers that are not covered in depth in other courses. (Permission of instructor)

Credit variable 2-4

Computer Science Courses

Computer science courses may be taken as computer science electives except as noted.

ICSP-203  
Registration # 0601-203  
AP Pascal  
This course is used only for the purpose of transferring in Advanced Placement (AP) Pascal credit. Amount of credit (either 4 or 8 quarter hours) will depend upon the student's score in the AP Pascal AB exam. Transfer credit of 4 quarter hours will be granted for scores representing mastery of the principles of the programming language Pascal. Topics include variables, expressions and assignment, control structures (sequencing, selection, and repetition), modularity via modules, procedures and functions, parameter mechanisms, recursion, one- and two-dimensional arrays. Transfer credit of 8 quarter hours will be granted for scores representing mastery of the above principles and basic data structures. These topics would include arrays, records, pointers, dynamic storage allocation, linked lists, stacks, queues, and trees. May not be taken for credit.

Class 0, Credit variable

ICSP-241  
Registration #0601-241  
Programming I Algorithmic Structures  
An introduction to programming emphasizing the development and documentation of modular computer-based algorithms. A structured procedural programming language (e.g., MODULA-2) is used to demonstrate modern programming principles. Topics include variables, expressions and assignment, control structures (sequencing, selection and repetition), modularity via modules, procedures and functions, parameter mechanisms, recursion, one- and two-dimensional arrays, and identifier scope in block structured languages. Programming assignments are an integral part of the course.

Class 3, Lab 2, Credit 4

ICSP-242  
Registration #0601-242  
Programming II Data Structures  
An introduction to the basic data structures used in computer applications. Both abstract concepts and implementation details will be discussed, including comparisons of alternative implementations. Topics include arrays, records, pointers, dynamic storage allocation, linked lists, stacks, queues, and trees. Programming projects are an integral part of the course. (ICSP-241)

Class 3, Lab 2, Credit 4

ICSP-243  
Registration #0601-243  
Programming III Design and Implementation  
A first course on the design and implementation of moderately large software systems. Modern principles of design and testing will be presented in class and reinforced by programming assignments. The importance of both internal and external program documentation will be stressed. Topics include top-down design, stepwise refinement, test data selection, modularity measures (cohesion and coupling), common programming paradigms, and advanced file I/O. Programming projects are required; one of these will be a team project. (ICSP-305)

Class 3, Lab 2, Credit 4

ICSP-305  
Registration #0601-305  
Assembly Language Programming  
A study of assembly language concepts and programming methods, including computer organization, assembly process, addressing, binary arithmetic, relocatability, storage allocation, subroutine linkage, looping and address modification, character manipulation, bit manipulation, floating point arithmetic, decimal instructions, some I/O, macros, and debugging techniques. Programming projects will be required. (ICSP-242)

Class 4, Credit 4

ICSP-306  
Registration #0601-306  
Systems Programming Fundamentals  
A study of systems programming concepts and techniques. Topics include the roles of assembly languages, systems implementation languages, systems macros and supervisor calls, program linkage, reentrant and recursive subroutines, I/O programming at the device level, macros and conditional assembly. Programming projects will be required. (ICSS-325)

Class 4, Credit 4

ICSP-307  
Registration #0601-307  
Business Applications Programming  
An introduction to the concepts and techniques relevant to the business programming environment. Structured COBOL is used to solve common business application problems, including report generation, sorting and table processing and generation, and complex I/O processing. Project management, programming teams, and the module stubs for prototype development are used in the course. Programming projects will be required. (ICSS-325)

Class 4, Credit 4
ICSP-309  C Programming
Registration #0601-309
The course is an introduction to the C language for programmers already familiar with a high-level language and an assembly language. Topics include: data types and data structures, control structures, I/O, pointers, program design and maintenance, programming techniques, and interfacing with assembly language. (ICSP-305) Cannot be taken for credit if credit has been given for ICSP-306.
Class 1, Credit 1

ICSP-319  Scientific Applications Programming
Registration #0601-319
An introduction to classical algorithms used in the solution of numerical problems encountered in science and engineering. The FORTRAN and APL languages will be introduced as tools for implementing these algorithms. Topics include an introduction to FORTRAN and APL, algorithms for finding roots of equations, solutions to systems of equations, general matrix manipulation. Programming projects will be required. (ICSS-325)
Class 4, Credit 4

ICSP-450 Programming Language Concepts
Registration #0601-450
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. The course emphasizes the concepts underpinning modern languages, rather than the mastery of particular language details. Programming projects will be required. (ICSS-325)
Class 4, Credit 4

ICSP-488 Programming Systems Workshop
Registration #0601-488
A workshop for the application of systems analysis, specification, design, implementation, and documentation techniques. Students will work in teams to solve specific problems. While working toward a solution of their problems, students will practice requirements analysis, system specification, data modeling, design specification, implementation, documentation, project management, quality assurance and software testing. Programming projects will be required. (ICSS-435, 485)
Class 4, Credit 4

ICSS-101 Freshman Seminar
Registration #0603-101
This course provides first-year students an opportunity to build upon skills necessary to succeed in the Computer Science Program. Through interactions in a small group environment, students will make friends with other computer science students, create a stronger bond with RIT and their college through increased relationships and extended orientation information, and focus on communication and small group skills valuable for future project work. The students will become more knowledgeable about the computer science curriculum, career options, and ethical issues.
Credit 1

ICSS-312 Software Engineering
Registration #0603-312
An introduction to basic software engineering methodologies and technologies used to develop high-quality, cost-effective software under time and resource constraints. The course focuses on the development of software products, while maintaining a broad perspective that emphasizes both process and product viewpoints. Topics include an overview of software engineering and software engineering paradigms, project planning, metrics, and cost estimation models, requirements analysis, design techniques and strategies, implementation concerns, quality assurance, software testing techniques and strategies, and software maintenance and configuration management. (ICSS-325)
Class 4, Credit 4

ICSS-315 Digital Computer Organization
Registration #0603-315
An introduction to computer architecture and implementation. Topics include Boolean algebra, combinatorial and sequential circuit design, flip-flops and adders, storage mechanisms and their organization, instruction fetching, decoding, and execution in a simple CPU, microprogramming, input/output subsystems, and interrupts. The laboratory experiments introduce elementary integrated circuit building blocks including gates, flip-flops, registers, counters and elementary sequential circuits. (ICSP-305)
Class 3, Lab 2, Credit 4

ICSS-325 Data Organization and Management
Registration #0603-325
A course on the considerations associated with the external storage of data. Topics include file organization (sequential, indexed and direct access), secondary storage devices, an introduction to external sorting and searching, and the basics of database organization and management. Programming projects will be required. (ICSP-243 or ICSS-360)
Class 3, Lab 2, Credit 4

ICSS-355 The Human Side of Computers
Registration #0603-355
The impact of computer systems on society is studied via class discussion, lectures, and films. Current topics such as the following are covered: the impact of computers on employment, automation and the labor force; overview of computer applications in government; innovative medical applications; robots in industry; office automation; computers in education and computer assisted instruction issues; privacy and the Freedom of Information Act; computer abuses and crime; the impact on law enforcement; the future; a cashless society; universal identifiers; computers in the home. Participants will develop several short discussion papers and a major study in one of the course topics. (ICSP-241)
Class 4, Credit 4

ICSS-360 Fundamentals of Computer Science for Transfer Students
Registration #0603-360
This course covers selected topics from ICSP-241, 242 and 243, and introduces students to the Unix operating system, the Modula-2 programming language, and concepts of software engineering. This course is intended for students with previous programming experience and a background in data structures. Open only to transfer students and students who have received advanced placement credit for ICSP-242; not to be taken as a computer science elective. (ICSP-242 or equivalent)
Class 3, Lab 2, Credit 4
ICSS-380  Introduction to Computer Science Theory
Registration #0603-380
A survey of important topic areas in theory of computer science. Topics may include regular expressions; deterministic and non-deterministic finite state machines; analysis of time and space complexity of algorithms; algorithm design paradigms, concept of NP-Hard and NP-Complete algorithms; introduction to formal correctness of programs; Turing machines; and the halting problem. (Corequisite SMAM-266 or SMAM-467; SMAM-265)

Class 4, Credit 4

ICSS-400  Logical Design
Registration #0603-400
An in-depth study of the logical design of digital circuits. Topics include combinational circuit design with emphasis on use of MSI and LSI circuits and CAD tools, sequential circuit synthesis, both synchronous and asynchronous, and an introduction to interfacing techniques. Additional topics to be covered include testing, CAD tools such as logic simulators and logic reduction programs, integrated circuit technologies, and an introduction to VLSI design. Lab experiments required. (ICSS-455 and SMAM-265 or equivalent)

Class 3, Lab 2, Credit 4

ICSS-420  Data Communication Systems
Registration #0603-420
This course is an introduction to the concepts and principles of computer communication subsystems. It examines the effects of communications media and software protocols on network performance, cost, and reliability. The course covers the physical interconnection of machines, first-level software considerations of the hierarchical model for computer network design, and local area networks. (SMAM-351 and third-year standing in Computer Science)

Class 4, Credit 4

ICSS-430  Numerical Methods
Registration #0603-430
Topics include introductory error analysis, roots of an equation, solution of systems of linear and non-linear equations, interpolation, power series calculation of functions, numerical integration, and first order ordinary differential equations. The computational aspects rather than mathematical development will be emphasized. Programming projects will be required. (Either SMAM-252 or SMAM-215, and a high-level scientific programming language)

Class 4, Credit 4

ICSS-435  Systems Specification, Design and Implementation
Registration #0603-435
An introduction to the basic concepts of systems analysis, specification, design and implementation, and project management. Topics include an introduction to methodologies and tools in system design, with an emphasis on structured design techniques. Tools include scheduling tools, structured English, structured flowcharts, decision trees, Jackson design method, Warnier-Orr diagrams, dataflow diagrams, hierarchical design of programming systems, and cost estimation models. Online design tools may be used to prepare diagrams and specifications. (ICSS-325)

Class 4, Credit 4

ICSS-440  Operating Systems
Registration #0603-440
A general survey of operating system concepts. Topics include process synchronization, interprocess communication, deadlock, multiprocessing and multiprocessor, processor scheduling and resource management, memory management, overlays, static and dynamic relocation, virtual memory, file systems, logical and physical I/O, device allocation, I/O processor scheduling, process and resource protection. (ICSS-315, 325)

Class 4, Credit 4

ICSS-455  Expert Systems
Registration #0603-455
An introduction to the field of artificial intelligence, including both theory and applications. A programming language that allows effective symbolic manipulation (PROLOG, LISP) is used to demonstrate the capabilities and limitations of the material presented in class. Topics include search strategies and their implementation, logic, networks, frames and scripts, productions, symbolic manipulation and list processing, problem-solving methods, expert systems, natural language understanding, and selections from vision, robotics, planning and learning. Programming assignments are an integral part of the course. (ICSS-450)

Class 4, Credit 4

ICSS-456  Expert Systems
Registration #0603-456
This course provides an introduction to the issues and techniques employed in expert systems. Topics will include a consideration of successful existing systems, control strategies, expert system building tools and environments, knowledge acquisition and uses of expert systems technology. Students will participate in group projects involving both the creation of expert systems and explorations of ways to effectively use such systems. (ICSS-455)

Class 4, Credit 4

ICSS-480  Formal Languages
Registration #0603-480
Formal language theory and principles. Topics include regular, context free and context sensitive grammars; finite automata, pushdown automata, and Turing machines, and an introduction to unsolvability and computability. (ICSS-380)

Class 4, Credit 4

ICSS-485  Data Base Concepts
Registration #0603-485
A broad introduction to data base management systems (DBMS) and the design, implementation, and applications of data bases. Topics include an overview of DBMS architectures, concepts and implementations of the relational model, data base design and modelling techniques, hierarchical and network approaches, and issues such as recovery, concurrency, physical implementation concerns, and performance and management aspects. Optional topics include distributed data bases, data base machines, and data base interfaces and languages. A data base programming project is required. (ICSS-325)

Class 4, Credit 4

ICSS-499  Cooperative Education
Registration #0603-499
One quarter of appropriate work experience in industry.

Credit 0
ICSS-510 Software Specification and Design
Registration #0603-510
An introduction to software specification methods and the transformation of specifications into modular designs suitable for implementation. Qualitative and quantitative measures of good design will be coupled with discussions of specific design methodologies. The role of design in the larger software life cycle will be stressed. Topics include a review of formal and informal specification techniques, key attributes of successful designs, design methodologies and techniques, transformation of specifications into data structures and algorithms comprising a design, and design documentation. Some programming to demonstrate design feasibility may be required. (ICSS-312, SMAM-266)
Class 4, Credit 4

ICSS-511 Software Testing and Quality Assurance
Registration #0603-511
An introduction to software quality assurance and its relationship to testing, leading to the production of acceptable software products. Software inspections and testing techniques will be discussed in detail, and their roles in software quality assurance will be stressed. (ICSS-312)
Class 4, Credit 4

ICSS-515 Analysis of Algorithms
Registration #0603-515
A course covering the techniques and mathematics needed to analyze the computational complexity of algorithms. Several classic algorithm paradigms will be studied to determine their applicability and space/time efficiency. (ICSS-380)
Class 4, Credit 4

ICSS-520 Computer Architecture
Registration #0603-520
An introduction to computer architecture. Includes a survey of computer architecture fundamentals exemplified in commercially available computer systems, including classical CPU and control unit design, register, primary memory organization and access, internal and external bus structures, and virtual memory schemes. Alternatives to classical machine architecture, such as the stack machine and the associative processor, are defined, and compared. Parallel processors and distributed systems are also presented, along with an analysis of their performance relative to non-parallel machines. Programming projects will be required. (ICSS-440)
Class 4, Credit 4

ICSS-521 Introduction to Microprocessor Systems
Registration #0603-521
An examination of microcomputers and microcomputer applications, including the study of microprocessors and their use in the construction of microcomputers. Additional topics covered include microcomputer busses, parallel and serial interfaces, analog interfacing, interrupts, and real time clocks. The use of microprocessors in real world situations is emphasized. Single board microcomputer systems are used in laboratory projects to explore hardware and software design issues, as well as memory design and I/O interface techniques. Students who have taken ICSS-545 cannot receive credit for this course. Programming projects will be required. (ICSS-315)
Class 3, Lab 2, Credit 4

ICSS-530 Fundamentals of Discrete Simulation
Registration #0603-530
An introduction to discrete simulation modeling. Methods for the design of discrete simulation models are examined, and simulation models are designed and implemented using a general purpose discrete simulation language. Related topics such as the validity and appropriateness of general statistics for the model are covered. Both the theoretical and statistical aspects of modeling are examined. Programming projects will be required. (SMAM-309 or SMAM-352 and third-year standing in Computer Science)
Class 4, Credit 4

ICSS-531 Introduction to Parallel Computing
Registration #0603-531
A study of the hardware and software issues in parallel computing. Topics include an introduction to the basic concepts, parallel architectures, parallel algorithms, parallel languages, network topology, coarse- versus fine-grained parallelism, applications, parallel programming design and debugging. Programming projects will be required. (ICSP-450, ICSS-440)
Class 4, Credit 4

ICSS-532 Parallel Algorithms and Program Design
Registration #0603-532
A study of the principal trends in parallel algorithm design through the analysis of algorithms used in various areas of application. Specific techniques that have gained widespread acceptance will be highlighted. The course will investigate the interplay between architecture and algorithmic structure and will discuss the effect that these issues have on the complexity and efficiency of parallel algorithms. Each student will be required to research an area of parallel program design and then implement a parallel computing project for an application within that area. Programming projects will be required. (ICSS-531)
Class 4, Credit 4

ICSS-540 Operating Systems Laboratory
Registration #0603-540
Application of operating system concepts. Laboratory work includes development of a small multi-tasking operating system and a study of its functional characteristics; special topics include I/O programming, interrupt handling, resource allocation and scheduling methods. A significant programming project is an integral part of the course. (ICSP-306, ICSS-440)
Class 4, Credit 4

ICSS-541 Introduction to Computer Networks
Registration #0603-541
This course presents the concepts and principles of the higher level protocols of the ISO reference model, as introduced in ICSS-420 Data Communication Systems. Included in this course will be the investigation of network topologies, delay analysis, routing techniques, interconnection of networks, security issues and user level services. (ICSS-420)
Class 4, Credit 4

ICSS-542 Distributed Systems Laboratory
Registration #0603-542
This course will build on topics developed in ICSS-420 Data Communication System and ICSS-541 Introduction to Computer Networks in a lab setting. Students will be required to design and implement a small computer network addressing issues such as routing strategies, virtual circuits vs. datagrams, data link protocols, and user (presentation) level services. (ICSS-540, 541)
Class 4, Credit 4
ICSS-S45 Computer Architecture Laboratory
Registration #0603-545
This course applies the hardware and software concepts learned from logic design, computer architecture, data communications, and operating systems. Laboratory work will include the design, implementation, debugging, and documentation of major hardware/software projects. Topics to be presented in the lecture include busses, interfacing, bit slice architectures, microprogramming, microprocessors, analog interfacing, and real time computing. Additional topics related to the specific laboratory projects will also be covered. (ICSS-400, 420, and 520)
Class 3, Lab 2, Credit 4

ICSS-555 Software Engineering Project Laboratory
Registration #0603-555
This course provides practical experience in software engineering in a team project setting. Given the specifications for a substantial software system, student teams will design, code, and test the system, using modern software engineering methods and software quality assurance techniques. Computer-aided software engineering (CASE) tools will be emphasized, including design, testing, and configuration management tools. Software inspections will be emphasized as a means for achieving high-quality software. (ICSS-510, 511)
Class 4, Credit 4

ICSS-560 Compiler Construction Laboratory
Registration #0603-560
A course in the design and implementation of high-level language compilers. Laboratory projects to be assigned in the areas of parsing, code generation, code optimization, and language design. (ICSS-580)
Class 4, Credit 4

ICSS-565 Computer Systems Selection Laboratory
Registration #0603-565
A study of computer systems design, evaluation, and selection methodology. The design aspect deals with the problem of specifying physical systems on the basis of logical design criteria, and performance analysis of existing and proposed computer systems. The selection aspect covers vendor proposal requests, evaluation and validation of proposals, and procurement methods. (ICSS-315, 325)
Class 4, Credit 4

ICSS-570 Introduction to Computer Graphics Laboratory
Registration #0603-570
A study of the hardware and software principles of computer graphics. Topics include an introduction to the basic concepts, 2-D transformations, viewing transformations, display file structure, geometric models, picture structure, interactive and non-interactive techniques, raster graphics fundamentals, 3-D fundamentals, graphics packages, and graphics systems. Students will use and develop a graphics software system based on an accepted graphics standard. Programming projects will be required. (Third-year standing in Computer Science)
Class 4, Credit 4

ICSS-571 Computer Graphics Laboratory
Registration #0603-571
This project-oriented course will build on topics developed in ICSS-570. Expanded topics will include: standard graphics software, animation techniques, 3-D modeling methods, hidden surface and line algorithms, shading, antialiasing, color models, and design of the user interface. Students will be required to design and implement an interactive system for an application which incorporates several of the above areas. Programming projects will be required. (ICSS-570)
Class 4, Credit 4

ICSS-580 Language Processors Laboratory
Registration #0603-580
A course exposing students to issues in the design of a variety of language processors and translators. The basic concepts will be presented in conjunction with the design of several such programs (e.g., assemblers, compilers, linkage editors, and processors). Programming projects will be required. (ICSP-450 and ICSP-306 or ICSP-309)
Class 4, Credit 4

ICSS-590 Seminar in Computer Science
Registration #0603-590
Current advances in computer science. (Prerequisites set by instructor)
Class 2-4, Credit 2-4

ICSS-599 Independent Study
Registration #0603-599
Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to study particular computer science topics in greater depth. (Faculty and departmental approval is required prior to registration. A maximum of two independent study courses is allowed.)
Class 2-4, Credit 2-4

ICSS-690 Seminar in Computer Science
Registration #0603-690
Current advanced topics in computer science. Open to graduate students and fourth- and fifth-year undergraduates. (Prerequisites set by instructor)
Class 4, Credit 4
Packaging Science

IPKG-201 Principles of Packaging
Registration #0607-201
An overview of packaging: the historical development of packaging, 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 will be presented, along with information about economic importance, social implications, and packaging as a profession.
Class 4, Credit 4

IPKG-301 Engineering Design Graphics
Registration #0607-301
A basic course in engineering drawing. Topics include, but are not limited to, lettering, line quality, use of instruments, freehand sketching, orthographic projections, pictorials, sections, auxiliary views, and dimensioning.
Class 1, Lab 3, Credit 3

IPKG-302 CAD Drawing
Registration #0607-302
A course in computer-aided drafting (CAD). Students will learn how drawing is accomplished using a CAD application package. Course begins with basics and progresses to advanced CAD practices. Drawing assignments required, concentrating on packaging applications. (IPKG-301)
Class 1, Lab 3, Credit 3

IPKG-311 Packaging Materials I
Registration #0607-311
The manufacture, physical and chemical properties, and uses of common packaging materials. Emphasis is on metals and plastics used in packaging, and adhesives, propellants, and other component materials. (IPKG-201)
Class 4, Credit 4

IPKG-312 Packaging Materials II
Registration #0607-312
The manufacture, physical and chemical properties, and uses of common packaging materials. Emphasis is on paper, paperboard, wood, and glass used in packaging applications. (IPKG-201)
Class 4, Credit 4

IPKG-313 Methods of Evaluation
Registration #0607-313
Information about recognized standard testing procedures will be presented, and students will gain practical experience in the operation of various commonly used testing instruments that determine physical properties of fibre, metal, plastic, and glass packaging materials. (IPKG-201)
Class 1, Lab 4, Credit 3

IPKG-321 Rigid Containers
Registration #0607-321
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 will be analyzed for basic container types. Students will practice structural design and testing of prototype containers. Primary emphasis will be on rigid paperboard, glass, plastic and metal containers (IPKG-301, 311,312)
Class 2, Recitation, Lab 2, Credit 4

IPKG-322 Flexible Containers
Registration #0607-322
Corollary course for 321. Primary emphasis will be on flexible paper, foil, plastic, and laminated materials, and selected processing techniques. (IPKG-301, 311, 312)
Class 2, Recitation, Lab 2, Credit 4

IPKG-341 Computer Applications
Registration #0607-341
Application of computer techniques and data processing for packaging. Review and analysis of current computer software packages for packaging, including optimum sizing, process control, simulation, and specification preparation. Computer program development and coding projects associated with packaging are assigned.
Class 2, Lab 4, Credit 4

IPKG-401 Career Seminar
Registration #0607-401
Career opportunities in Packaging Science; methods and procedures used in obtaining co-op and entry-level positions. Career advancement within the corporate organization; job changes.
Class 1, Credit 1

IPKG-420 Technical Communication
Registration #0607-420
Introduction to the principles of effective written technical communication for the packaging professional. Topics include: memos, business letters, summary activity reports, technical proposals, and research papers. This course is open only to packaging majors, and is required as part of the writing skills certification process under the RIT policy. (IPKG-321, 322)
Class 4, Credit 4

IPKG-431 Packaging Production Systems
Registration #0607-431
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. The characteristics of such equipment and maintenance programs will be considered. Students will gain practice in setting up complete production lines for packaging various products. (IPKG-321, 322)
Class 2, Lab 4, Credit 4

IPKG-432 Packaging for Distribution
Registration #0607-432
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 will be studied. (IPKG-301, 321, 322)
Class 2, Lab 4, Credit 4

IPKG-433 Packaging for Marketing
Registration #0607-433
The interrelationship between packaging and marketing, detailing how the retail consumer package can be used as a marketing tool. The course concentrates on a systematic approach to developing an optimum package for a given product to meet the demands of the retail market. Advertising, marketing demographics, and the impact of color upon packaging will be considered. Students will gain practice in the development of a complete package system. (IPKG-431, 432)
Class 2, Lab 4, Credit 4
A detailed study of federal, state, and local regulations that affect packaging. History of the development of packaging law; detailed study of recent packaging regulations, including the Fair Packaging and Labeling Act and the Poison Prevention Packaging Act; consideration of Food and Drug Administration regulation of packaging, including requirements for tamper evident packaging; hazardous materials packaging regulations administered by the Department of Transportation; freight classifications, freight claims, the Interstate Commerce Act as it applies to shipment of goods in packages; weights and measures law; consumer product safety law, environmental law, and patent, trademark, and copyright law as they apply to packaging.

Class 3, Credit 3

Principles of Shock and Vibration

Registration #0607-485

A study of the factors involved in analyzing potential damage to packaged items resulting from impact or vibration forces. Students will be expected to master basic mathematical and physical concepts and to use various pieces of testing equipment. (IPKG-432)

Class 2, Lab 4, Credit 4

Packaging Co-op

Registration #0607-499

One quarter of appropriate work experience in industry. Two quarters of co-op experience are required. (IPKG-321, 322)

Credit 0

Introduction to Electrostatics

Registration #0607-510

An introduction to the factors involved in understanding and controlling electrostatic phenomena and protecting sensitive devices from ESD and other waveforms. Evaluation and analysis of protective materials and performance standards will be taught, as well as equipment operation and evaluation procedures. (IPKG-322, SPSP-211; professional elective)

Class 4, Credit 4

Packaging Management

Registration #0607-520

A study of packaging organization in the contemporary corporation and project management techniques available to the packaging manager. Organization theory will be discussed and compared with typical industry practice. Other topics will include PERT, value analysis, and the impact of regulatory agencies upon packaging from a management standpoint. (Professional elective)

Class 3, Recitation 1, Credit 4

Packaging Economics

Registration #0607-524

A study of firm behavior with concentration on production costs and revenues. Market structures will be analyzed in order to develop an understanding of how packaging fits into the general economy. Students will be instructed in the use of basic economic reference materials for research purposes. A paper is required. (Professional elective)

Class 1, Credit 1 Class 2, Lab 4, Credit 4

Packaging Internship

Registration #0607-577

This course number is used by students in the Packaging Science program for earning internship credits. The number of credits and the nature of on-location experience is determined by the student's advisor, subject to approval of the department.

Credit variable 1-8
IPKG-590 Senior Thesis
Registration #0607-590
An in-depth study of some phase of packaging which will enable the student to make use of the knowledge and skills acquired during the course of the program.
Arranged, Credit 4

IPKG-598,599 Independent Study
Registration #0607-598, 599
Independent study, in consultation with the instructor, on any packaging-related topic. (Independent study total credit allowed is limited to a maximum of 8 credits.)
Arranged, Credit variable 1-4

School of Engineering Technology

ITES-099 Co-op Preparation
Registration #0606-099
This course is intended for third-year SET students. It introduces the concept of cooperative education and the services of the Office of Cooperative Education and Placement, and provides the student with basic job search skills: research and identification of potential employers; resume writing and correspondence; interviewing techniques. Ethics of the job search and expectations of employers will also be covered. This course is required for all SET students before registering for co-op and using the services of the Office of Cooperative Education and Placement.
Class 1, Credit 0

ITES-101 Survey of Engineering Technology
Registration #0606-101
A seminar course for the undeclared engineering technology student. Information and activities are presented to introduce students to the various engineering technology programs. Included will be discussions, presentations, and student activities enabling students to become familiar with RIT resources, adjust to college and college-level course work, and identify career interests. Students will practice communication skills, work in teams, and discuss issues such as values, diversity of cultures, and stress.
Class 2.5, Credit 2

Civil Engineering Technology

ITEC-101,102 Architectural & Structural Blueprint Reading
Registration #0608-101,102
(Residential, Commercial) Reading and interpretation of architectural and structural drawings; use of scales, symbols for materials, drafting conventions, schedules and specifications; freehand sketching, elementary mathematics, and some quantity take-off.
Credit 3

ITEC-198 Introduction to Civil Engineering Technology, Freshman
Registration #0608-198
Introduces freshmen to the CET program in order to ease the college transition. Information is provided on cooperative education, technical electives, liberal arts core and concentration courses, and preregistration procedures. Discussion of topics including P.E. registration and N.I.C.E.T. certification.
Class 1, Credit 1

ITEC-199 Introduction to Civil Engineering Technology, Transfer
Registration #0608-199
Introduces transfer students to the CET program in order to ease the transition from their previous colleges. Information is provided on cooperative education, technical electives, liberal arts core and concentration courses, and preregistration procedures. Discussion of topics including P.E. registration and N.I.C.E.T. certification.
Class 1, Credit 1

ITEC-201 Architectural Drawing I
Registration #0608-201
Introduction to architecture, the role of architectural drawings in the construction process, and basic drafting techniques used in architectural drawing including pencil techniques, freehand sketching and lettering. Introduction to drawings required in the traditional construction drawing set.
Credit 2

ITEC-202 Architectural Drawing II
Registration #0608-202
Introduction to the techniques of the architectural design process including preliminary presentation drawings, isometrics, and perspectives. Preparation of drawings required in the design and construction process of different building types. (ITEC-201)
Credit 2

ITEC-203 Architectural Drawing III
Registration #0608-203
Advanced study in the complete architectural process required in developing more complex building types. Preparation of design and schematic drawings of different building types with concentration on detail and construction drawings. (ITEC-202)
Credit 2

ITEC-204,205,206 Architectural Drawing
Registration #0608-204,205,206
IV, V, VI
Design development, presentation and working drawing preparation including: plans, elevation, sections, and details of different building types. Site planning, perspective presentation and related design skills. (ITEC-203)
Credit 2

ITEC-207,208,209 Architectural Drawing
Registration #0608-207,208,209
VII, VIII, IX
Advanced design development, presentation and working drawing preparation including: plans, elevation, sections, and details of different building types. Site planning, perspective presentation and related design skills. (ITEC-206)
Credit 2

ITEC-210 Engineering Graphics
Registration #0608-210
An introduction to engineering graphics as a means of communication in the technological occupations of manufacturing and construction. The course is laboratory oriented and provides development of basic graphical communication skills using manual and computer-aided drafting (CAD) techniques. The course is designed for students with no knowledge of engineering drawing.
Class 2, Lab 4, Credit 4
ITEC-220  Civil Engineering Graphics
Registration #0608-220
This course includes background information and actual work performance related to the preparation of plans and drawings for civil engineering works, as well as a basic exposure to the graphics of interfacing disciplines: architecture, mechanical and electrical engineering, and landscape architecture. It builds upon the fundamentals of graphics learned in ITEC-210, Engineering Graphics, and focuses on the actual drawings and related documents used in building civil engineering works: for example, site development, structures, water and wastewater transport systems, water and wastewater treatment facilities, highways, and bridges. (ITEC-210 or equivalent)
Class 2, Lab 4, Credit 4

ITEC-231  Surveying
Registration #0608-231
Introduction to surveying including measurement of horizontal distances, leveling, theory of error, bearings and azimuths, measurements of angles, tachymetry, traverse surveys and computations. Several field trips provide familiarization with instrument use. (High school algebra and trigonometry or equivalent)
Credit 4

ITEC-241  Building Construction
Registration #0608-241 (Materials)
Study of basic construction materials including concrete, masonry, metal, wood, bitumens, plastics, coatings, glass and glazing. Basic physical properties of materials are defined and emphasis is placed on practical applications. Design of concrete mixtures and basic stress-strain relationships are covered.
Credit 3

ITEC-242, 243  Building Construction I, II
Registration #0608-242,243 (Methods and Procedures)
Elements and details of building construction. Study of fundamental design concepts, building codes, foundations, wood, steel and concrete construction, specifications and construction management. (ITEC-241 or equivalent)
Credit 3

ITEC-251  Construction Contracting
Registration #0608-251
Construction activities from the contractors' viewpoint. Bidding procedure from bid advertisement to bid opening; bonds, insurance, contracts, subcontracts and bidding documents; construction safety, project planning, scheduling and control. Governmental controls including zoning and building codes.
Credit 3

ITEC-252, 253  Building Estimating I, II
Registration #0608-252,253 (Residential, Commercial)
Basic cost estimating of residential and commercial construction projects including types of estimates, quantity taken off, unit price, material and labor costs, overhead, profit and contingencies. Job cost data sources and cost indices are reviewed. (ITEC-101 or ITEC-203 or equivalent)
Credit 3

ITEC-301  Structural Theory
Registration #0608-301
Analysis of loads, determination of reactions, horizontal and vertical shear, shear diagrams, bending moments, axial and combined stress, truss analysis, deflections and introduction to computer analysis. (ITEM-302 and ITEM-303 or equivalents)
Credit 4

ITEC-302  Structural Design
Registration #0608-302
Fundamentals of structural design including the basic design concepts of structural steel, reinforced concrete, and timber: design of beams, columns, and trusses including connections. (ITEC-301 or equivalent)
Credit 4

ITEC-311,312,313  Architectural Projects
Registration #0608-311,312,313
Advanced work in architectural drafting to develop specialized skills in design development, contract documents, frame construction, shop drawings, site planning or other related areas. Program to be planned individually to match the individual requirements of each student. (ITEC-206 or equivalent)
Credit 2

ITEC-320  Plane Surveying
Registration #0608-320
This course provides an introduction to plane surveying. Topics include note keeping, line and grade measurement, leveling, vertical and horizontal measurement, care of instruments and stadia. The course exposes the student to all aspects of plane surveying in regard to civil engineering technology in a "hands-on" concept involving both office and field work. (Trigonometry)
Class 3, Lab 2, Credit 4

ITEC-330  Materials of Construction
Registration #0608-330
A study of the materials used in Portland cement and asphalt cement concrete. Laboratory work will include mix design and the testing of concrete mixes and materials by ASTM and AASHO Standard Methods.
Class 3, Lab 2, Credit 4

ITEC-340  Route Surveying
Registration #0608-340
Introduction to route surveying and earth work. Topics include simple horizontal curves, reverse and compound curves, transversal spiral curves, vertical curves, plan and profile views, cross sections, volume computations, and mass diagrams. Laboratory exercises include layout of curves in field. (Plane Surveying)
Class 3, Lab 2, Credit 4

ITEC-360  Elementary Soil Mechanics
Registration #0608-360
Introduction to soil mechanics and its application to problems encountered in civil engineering. Major topics include soil classification, strength and compressibility analysis, and effect of water on soil characteristics. Laboratory tests commonly used to evaluate engineering properties of soils are performed. (ITEM-302, 303 or equivalent)
Class 3, Lab 2, Credit 4

ITEC-380  Elementary Structures
Registration #0608-380
Application of the principles of Statics and Strength of Materials to the design of basic structural elements such as beams, columns, trusses, slabs, and footings. The emphasis is on structural steel (allowable stress design) and reinforced concrete (strength design), with some time spent on timber members (allowable stress design). There will also be practice in the use of AISC and ACI specifications. (ITEM-301, 303)
Class 4, Credit 4
ITEC-404 Applied Mechanics of Materials  
Registration #0608-404

Basic strength of material and statics are reviewed. Advanced topics are covered to include stress and strain, Mohr's circle concept, transversely loaded members, statically indeterminate problems, Euler's equations, and column design principles; dynamic effects in analysis of material strength. (ITEM-302, 303)

Class 4, Credit 4

ITEC-420 Hydraulics  
Registration #0608-420

Study of principal physical and mechanical properties of liquids, hydrostatic pressure and forces; pressure measuring devices; buoyancy and flotation, flow of liquids in closed conduits, and introductory principles of piping systems design; pumps and pump selection, flow of water in open channels and introduction to their design. (Physics, ITEM-302, 303)

Class 3, Credit 3

ITEC-421 Hydraulics Laboratory  
Registration #0608-421

Experimental study of principal physical properties of liquids and major laws of fluid mechanics. Operating various laboratory equipment and devices while concurrently taking ITEC-420, Hydraulics, for principal theoretical studies of physical and mechanical properties of liquids, hydrostatics fluid, kinematics and dynamics, hydraulic machinery and their operation.

Lab 3, Credit 1

ITEC-422 Elements of Building Construction  
Registration #0608-422

Elements and details of building construction; study of building codes from a design concept; foundations; wood, steel and concrete construction and wall systems; overview of highway bridges.

Class 4, Credit 4

ITEC-432 Water and Wastewater  
Registration #0608-432

Discussion of surface and groundwater sources. The hydraulic design of sanitary and storm sewer systems and water distribution systems, including pump systems and storage. (ITEC-420, 421)

Class 2, Credit 2

ITEC-438 Principles of the Treatment of Water and Sewage  
Registration #0608-438

An introduction to water and wastewater treatment, interpretation of analyzed physical, chemical, and biological parameters of water quality with regard to the design and operation of treatment processes and to the control of the quality of natural water; fundamental principles and applications of physical, chemical and biological processes employed in water and wastewater treatment; analysis of waste assimilative capacity of streams, with an introduction to microbiology. (SCHG-272, 276)

Class 3, Lab 2, Credit 4

ITEC-444 Mechanical Equipment for Buildings  
Registration #0608-444

Presentation of mechanical and electrical equipment used in building construction. The codes applicable to plumbing, heating, air conditioning, and operation and control will be studied.

Class 2, Credit 2

ITEC-460 Construction Equipment  
Registration #0608-460

Fundamentals of equipment selection; determining equipment requirements based upon the design and capabilities of currently available construction equipment. Emphasis is given to economic aspects of equipment ownership, principles of equipment management, and earthmoving project analysis.

Class 4, Credit 4

ITEC-470 Timber Design and Construction  
Registration #0608-470

Discussion of the properties of structural lumber including grades, sizes, and design properties. Design of beams, columns, trusses, plywood diaphragms and shear walls. Other topics include glued-laminated timber and nailed joints. The provisions of various building codes are investigated, and the specification of the National Forest Products Association is followed. (ITEC-404)

Class 4, Credit 4

ITEC-480 Groundwater Hydraulics  
Registration #0608-480

Groundwater movement, flow-net concept, graded filter design and construction, flow to wells and trenches, dewatering system analysis and design, water-flow cut-off methods and their use for construction. (ITEC-420 and 527 or permission of instructor)

Class 4, Credit 4

ITEC-482 Hydrology  
Registration #0608-482

Course presents major theoretical and practical considerations of hydrology in application to study groundwater hydraulics, hydraulic structures, water transportation systems, and transportation engineering. (ITEC-420)

Class 4, Credit 4

ITEC-485 Hydraulic Structures  
Registration #0608-485

This course will study analysis and design of dams, spillways, storage reservoirs, canals, tunnels and river diversion systems for the effective utilization of water resources, energy, soil conservation, and flood control. Principles of maintenance and operation of hydraulic structure also will be studied. (ITEC-432)

Class 4, Credit 4

ITEC-490 Structural Analysis  
Registration #0608-490

Introduction to the analysis of statically determinate and indeterminate structures by classical and modern techniques. The types of structures covered include beams, trusses, and frames that are loaded in the plane of the structure. Topics include introduction to cables and arches, influence lines and the effect of moving and impact loads, determination of degree of indeterminacy, approximate methods (including the Portal Method), slope deflection, moment distribution, and an introduction to matrix methods. Some computer work is involved. (ITEC-404)

Class 4, Credit 4

ITEC-495 Structural Design  
Registration #0608-495

Structural design in reinforced concrete and structural steel. In the reinforced concrete portion of the course, emphasis is on the strength method; members and frames are primarily of the indeterminate type. In the structural steel portion, the LRFD method is used in designing members and frames that are primarily determinate. In both portions the accent is on building construction. Provisions of the ACI code and AISC specification are followed. (ITEC-490)

Class 4, Credit 4
ITEC-499 Cooperative Education
Registration #0608-499
One quarter of appropriate work experience in industry. (ITES-099)
Credit 0

ITEC-500 Labor Relations
Registration #0608-500
Introduction to the fundamentals of labor law and its applications to the construction industry. Topical areas include the Fair Labor Standards Act, Davis-Bacon Act, Title VII of the Civil Rights Act, National Labor Relations Act, hiring halls, pre-hire agreements, strikes and Open Shop construction. Several guest speakers representing government, private industry and organized labor also lecture.
Class 2, Credit 2

ITEC-505 Construction Safety
Registration #0608-505
General safe practices in construction operations. Safety standards, both voluntary and mandatory. Employer responsibilities under the provisions of OSHA and state labor law. A portion of this course is audiovisual.
Class 2, Credit 2

ITEC-509 Cost Estimating
Registration #0608-509
An introduction to direct cost estimating of a construction project. The estimating techniques reviewed include productivity analysis, material pricing, and quantity take-offs. (ITEC-422 may be taken concurrently.)
Class 1, Recitation 2, Credit 2

ITEC-510 Design of Water Treatment Facilities
Registration #0608-510
Principles of water treatment plant design, conceptual and hydraulic design of water purification and conditioning facility. Includes: settling, filtration, softening, disinfection, organics removal, and plant design construction elements. (ITEC-438)
Class 2, Credit 2

ITEC-513 Computer Techniques in Civil Engineering Technology
Registration #0608-513
Designed as a supplement to the introductory programming course. Topics include: word processing; use of packaged programs such as COGO; electronic mail; spreadsheets and design of programs in BASIC and Fortran. Work will be done using time-sharing, primarily, but with some time devoted to personal computers. (ICSA-205)
Class 2, Credit 2

ITEC-514 Land Planning
Registration #0608-514
The environmental and social aspects of land planning are covered as well as the engineering and cost considerations. 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. (Drafting, surveying, and ITEC-432)
Class 4, Credit 4

ITEC-516 Analysis and Design of Reinforced Concrete Structures
Registration #0608-516
The course is organized to continue with the study of reinforced concrete that was begun in ITEC-495. Topics include the design of retaining walls, footings, two-way slabs, rectangular in-ground tanks, and columns. The strength method of the ACI code is used.
Class 4, Credit 4

ITEC-518 Masonry Design
Registration #0608-518
An introduction to masonry design and construction. Both brick and concrete masonry will be covered, with the emphasis on concrete masonry. Topics covered include terminology, non-reinforced masonry, reinforced masonry, joint reinforcement, types of mortar, design of bearing walls and partitions. Use will be made of various building codes and the publications of the Brick Institute of America, the National Concrete Masonry Association, the Portland Cement Association, and the Masonry Institute of America. (ITEC-404)
Class 2, Credit 2

ITEC-520 Design of Wastewater Treatment Facilities
Registration #0608-520
Principles of wastewater treatment plant design, conceptual and hydraulic design of activated sludge and trickling filter plants are studied. Tertiary treatment facilities, such as nitrogen and phosphorus removal will be discussed. Processes, plant design, and construction elements are stressed. (ITEC-438)
Class 3, Lab 2, Credit 4

ITEC-525 Hazardous Waste
Registration #0608-525
Identification, classification and legal aspects of hazardous waste are studied. Topics include: generator, transport, storage and disposal of hazardous waste with emphasis on chemical landfill and incineration of hazardous and toxic wastes. (ITEC-438)
Class 4, Credit 4

ITEC-527 Soil Mechanics and Foundations
Registration #0608-527
Study of physical, mechanical and engineering properties of soils; methods of determination of bearing capacity, stress distribution within soil mass and settlement; spread footing analysis and design; lateral earth pressure and retaining walls analysis and design, pile foundation analysis and design principles; slope stability, study of modern and traditional soil improvement technology. (ITEC-360, 404) (ITEC-528 Soil Mechanics Laboratory must be taken concurrently.)
Class 3, Credit 3

ITEC-528 Soil Mechanics Laboratory
Registration #0608-528
The Soil Mechanics Laboratory is to be taken concurrently with ITEC-527. Exercises will include tests in internal friction by direct shear, unconfined compression, triaxial compression, consolidation and compaction.
Lab 2, Credit 1
ITEC-530  Transportation Engineering  Registration #0608-530
The course exposes the student to the fields of highway, airport, and rail engineering. The areas of administration, planning, design, construction, maintenance, and operation are covered. After the introductory material is presented, stress is put on specific skills needed in these fields, including highway, rail, and airport standards, geometry and alignment, drainage, earthwork, safety standards, and structures. Amply field exposure to all elements is part of the formal structured program. (Route Surveying)
Class 4, Credit 4

ITEC-535  Pavement Design  Registration #0608-535
This course expands on the background of the Transportation Engineering core course, providing additional detailed engineering knowledge on pavement design. Included with the theoretical knowledge will be the development of, and practice in, the necessary design skills. The course includes the design of new pavements and also addresses the very active programs in pavement recycling, bridge and pavement rehabilitation, and strengthening. Problems are attacked in a practical manner, utilizing the expertise of national organizations and state highway departments involved in this work. (ITEC-330, 530)
Class 3, Lab 2, Credit 4

ITEC-544  Contracts and Specifications  Registration #0608-544
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, and trade standards such as ANSI, ASTM, and others. Students are required to develop and assemble a mock-up set of contract documents.
Class 2, Credit 2

ITEC-546  Professional Principles and Practices  Registration #0608-546
A treatment of legal and ethical aspects of the profession; review of codes of ethics and current professional problems; featuring several guest speakers representing different segments of the civil engineering field.
Class 1, Credit 1

ITEC-550  Construction Practices  Registration #0608-550
An introduction to basic construction management and organization with CPM scheduling, estimating, bidding, safety, labor, cost control and contracts. This is a survey course for non-construction students.
Class 4, Credit 4

ITEC-552  Analysis and Design of Steel Structures  Registration #0608-552
This course is organized to continue with the study of structural steel that was begun in ITEC-495. Topics include compression members subjected to axial load and bending; continuous beams, plastic design; design of trusses, connections, composite beams; a brief treatment of allowable stress design; design project. (ITEC-495)
Class 3, Credit 3

ITEC-556,557  Wastewater Treatment Plants  Registration #0608-556,557
A self-paced, audiovisual course. Emphasis on the functional aspects of wastewater treatment plants' operation. Discussion of the significance of the results of laboratory analysis and interpretation and application to the control of treatment processes. (ITEC-438 and permission of instructor)
Credit variable 1-4

ITEC-560  Construction Project Management  Registration #0608-560
An introduction to basic construction management and organization. Topics include company and project organization, bonds, insurance, bidding, cost and financial accounting, and project planning and scheduling. (ITEC-509 and ITEC-422 may be taken concurrently.)
Class 4, Credit 4

ITEC-561  Construction Project Management II  Registration #0608-561
An overview of advanced applications in construction management through precedence modeling. Both CPM and PERT precedence models will be used for scheduling, resource leveling, and cost control. (ITEC-560)
Class 4, Credit 4

ITEC-580  Senior Construction Seminar  Registration #0608-580
Special topics are offered in a seminar format. In the past topics have included construction finance, cost engineering, quality and production control, special engineering subjects, and value engineering. (Seniors only; permission of the instructor)
Class 3, Credit 4

ITEC-599  Independent Study  Registration #0608-599
A supervised investigation within a civil engineering technology area of student interest. Consent of the sponsor and departmental approval are required. Students are limited to a maximum of 2 credit hours per section and a maximum of 4 quarter credit hours of independent study projects in 1-2 sections in any one quarter, plus a maximum of 8 quarter credit hours of independent study credits earned toward degree requirements.
Credit variable 1-4

ITEE-201  DC Circuits  Registration #0609-201
An introduction to DC circuit analysis techniques. Topics include resistance, inductance, and capacitance, with circuit techniques of Ohm's Law, current-voltage division, simplification of series, parallel, bridge, and ladder networks, Kirchhoff's Laws, Thévenin's and Norton's Theorem, Mesh and Nodal Analysis and Superposition. (Corequisite SMAT-204)
Class 3, Lab 2, Credit 4

ITEE-202  AC Circuits  Registration #0609-202
AC circuits and devices with topics of phasor algebra, reactance, impedance, AC power and power factor, resonance, maximum power transfer, frequency, bandwidth, and three-phase circuits. Use of the computer to solve and simulate circuit problems. (ITEE-201; corequisite SMAT-420)
Class 3, Lab 2, Credit 4
ITEE-203 Electronics I
Registration #0609-203
An introduction to semiconductor theory covering the basics of semiconductor materials and the structure of P and N type semiconductors. Emphasis will be placed on diode and bipolar transistor characteristics, specifications, modeling, and applications. (ITEE-202, SMAT-420)
Class 3, Lab 3, Credit 4

ITEE-207 EET First-Year Orientation
Registration #0609-207
Introduction to electrical engineering technology. Topics include engineering technology versus engineering, registration system, learning styles, cooperative education, time organization and management, and electives in electrical engineering technology.
Class 1, Credit 1

ITEE-231 Logic
Registration #0609-231
Introduction to digital logic, number systems and codes, TTL gates, simplification of logic expressions, combination logic and sequential logic.
Class 3, Lab 2, Credit 4

ITEE-237 Introduction to Computer Operations I
Registration #0609-237
Introduction to computer software and hardware fundamentals. Students will gain an understanding of hardware components and software types. Lab will provide experience with word processing software, MS/PC DOS, utilities, hard disk management software, and Lotus 1-2-3.
Credit 3

ITEE-238 Introduction to Computer Operations II
Registration #0609-238
A continuation of Computer Operations I. The course includes an elaboration of microprocessor circuitry and introduces communication systems. A detailed examination of the interplay of memory and interface devices with the microprocessor will be presented. Topics including advanced DOS, VAX/VMS and UNIX will be explored. (ITEE-237 or equivalent)
Credit 3

ITEE-240 Microcomputer Organization
Registration #0609-240
The analysis of microcomputers with emphasis on system logic, timing, and interfacing with I/O devices. Functions and in-depth operation of these components will be studied by using diagnostic programs and digital test equipment. (ITEP-301, ITEE-238)
Class 3, Lab 2, Credit 4

ITEE-250 Computer Systems Troubleshooting
Registration #0609-250
Students will troubleshoot, repair, align, and maintain computer equipment to component and board level. Written reports as well as verbal presentations will be required. Students will be required to demonstrate professional technique in both lab and simulated field situations. (ITEE-240)
Lab 8, Credit 4

ITEE-271 Telecommunication Fundamentals
Registration #0609-271
A survey of and introduction to the structure and regulation of the telecommunications industry is provided. The basics of data communications, telephony, switching systems, ISDN, multiplexing, and networks are introduced. Data communication components, codes, and techniques are identified. Methods for selecting, implementing, and managing a computer network or telephone system are reviewed.
Class 4, Credit 4

ITEE-337 Electric Machines/Transformers
Registration #0609-337
Power concepts, magnetism, electro-magnetic force, fields, armature, commutators, rotors, stators, brushes, starters, controllers, DC motors, DC generators, AC motors, alternators, single-phase and three-phase dynamos, three-phase circuits, phasors and transformers-properties, isolation, efficiency and voltage regulation. Control of electric motors by solid state devices is introduced. (ITEE-201, 202, 203)
Class 3, Lab 2, Credit 4

ITEE-353 Introduction to Microprocessors
Registration #0609-353
Introduction to microprocessor software and hardware. Hexadecimal, 2’s complement arithmetic is used. Introductory programming of the 8085 in both machine and assembly language. Hardware considerations in a microprocessor system are discussed. Input/output and interrupts also are considered.
Class 3, Lab 3, Credit 4

ITEE-361 Electronics II
Registration #0609-361
A continuing course in the analysis and design of electronic circuits. Emphasis will be on the characteristics, operation, and biasing of both junction and insulated gate field effect transistors and the use of small signal parameters. Included is an introduction to frequency response of circuits. (ITEE-203)
Class 3, Lab 3, Credit 4

ITEE-362 Electronics III
Registration #0609-362
A continuation course in the analysis and design of simple linear circuits for students who have completed the introductory course sequence in transistor amplifiers. Included is the analysis of multistage transistor amplifiers and the differential amplifier. Emphasis is on the operational amplifier and its applications. Topics include the ideal operational amplifier, non-ideal characteristics, summing amplifiers, and integrators. Also included is an introduction to special purpose electronic devices (SCR, TRIAC, LCD, etc.) (ITEE-361)
Class 3, Lab 3, Credit 4

ITEE-363 Electronics IV
Registration #0609-363
This course applies the concepts of circuits and electronics to basic communication circuits for amplitude and frequency modulation. Topics studied are AM and FM transmission and reception, phase-locked loops, synthesizers, oscillators, and SSB communication systems (ITEE-362)
Class 3, Lab 2, Credit 4
ITEE-399  Independent Study
Registration #0609-399  (offered spring quarter only)
Independent study of a design project by electrical technology students. Department approval must be obtained during the fall quarter for spring quarter registration.
Class, Lab as required, Credit 4

ITEE-403  Advanced Circuit Theory
Registration #0609-403
An introduction to advanced circuit analysis techniques, including signal decomposition by Fourier Series and transient analysis using the Laplace Transform. (SMAT-421)
Class 3, Lab 2, Credit 4

ITEE-404  Control Systems I
Registration #0609-404
Closed-loop control systems are analyzed with respect to their stability, steady state accuracy, and transient response. The design of lead-lag compensation to improve system performance is included. (ITEE-403, SMAT-422)
Class 3, Lab 2, Credit 4

ITEE-407  EET Transfer Orientation
Registration #0609-407
Introduction to electrical engineering technology. Topics include engineering technology versus engineering, registration system, the quarter system, resources available at RIT, the cooperative education placement process, and electives in electrical engineering technology.
Class 1, Credit 1

ITEE-408  Transmission Lines
Registration #0609-408
Development and application of the general transmission line equation starting from the distributed lumped LC model. Topics include the propagation of electromagnetic waves in a coaxial line; voltage, current, and impedance; graphical methods for analysis; transmission lines as circuit elements (SMAT-422, ITEE-202)
Lecture 3, Lab 2, Credit 4

ITEE-411  Electrical Principles for Design I
Registration #0609-411
A service course offered to non-electrical majors studying in the technical disciplines. Topics covered include basic electrical circuits, network theorems, power and energy concepts, P.F. correction, and basics of transformers. The laboratory is an integral part of the course, and the experiments complement lecture material.
Class 3, Lab 2, Credit 4

ITEE-412  Electrical Principles for Design II
Registration #0609-412
An introductory survey course in the basics of analog and digital electronics. Analog topics include basic semiconductors, transistor circuits, operational amplifiers. Fundamental digital logic concepts include an introduction to microcomputers. (ITEE-411)
Class 3, Lab 2, Credit 4

ITEE-413  Applied Microprocessors
Registration #0609-413
Applications of microprocessors for manufacturing engineering technology students. Application of the INTEL 8085 microprocessor, with emphasis on the interface to SDK-85 microprocessors. Microcomputers as applied to robotics and numerically controlled machinery (ITEE-412)
Class 3, Lab 2, Credit 4

ITEE-414  Basic Electrical Principles
Registration #0609-414
Basic study of important electrical concepts for both AC and DC circuits. Topics covered include AC/DC circuit theory, single- and three-phase power distribution, power factor, line losses, efficiency, AC motors and transformers, energy costs, wiring methods, instrumentation and circuit protection. (SMAT-421)
Class 3, Lab 2, Credit 4

ITEE-424  Logic and Digital Devices
Registration #0609-424
A course covering digital design with logic gates and with PALs. Combinational logic circuits are covered with a review of Boolean algebra and Karnaugh mapping techniques. Combinatorial PALs and PALASM software are introduced. Sequential logic is introduced with the coverage of flip-flops and counters through the coverage of state machines. The state machine is covered in some detail with the use of ASMs, state graphs, and state tables. Registered PALs are introduced to implement state machine designs. (ITEP-301)
Class 3, Lab 2, Credit 4

ITEE-437  Computer Programming Techniques
Registration #0609-437
The objective of this course is to learn to write good, well documented programs using PASCAL as the programming language. The emphasis of the program will be to learn modern programming techniques and methods of solving problems using computers.
Class 4, Credit 4

ITEE-440  Discrete Amplifier Design
Registration #0609-440
Biasing of bipolar and field effect transistors is reviewed. Design and analysis of Class A amplifiers using small signal h-parameters are presented. Included are the topics of feedback and frequency response in multistage amplifiers. The design of Class A and B low-frequency power amplifiers is studied with special attention to transistor ratings and heat sinking requirements. (Corequisite ITEE-402)
Class 4, Lab 2, Credit 4

ITEE-441  Integrated Circuit Amplifiers
Registration #0609-441
A study of discrete differential amplifiers and integrated operational amplifiers, including applications in instrumentation, active filters, waveform generation and shaping, and precision rectifiers. Regulators, including switching regulators, are covered. (ITEE-440)
Class 4, Lab 2, Credit 5

ITEE-442  Advanced Electronics
Registration #0609-442
A review of basic operational amplifier circuits is supplemented by applications of special-purpose amplifiers. Use of op amps in signal generation, regulation, and active filtering is examined. Use of discrete transistors to augment power capabilities of integrated devices is included. (ITEE-403, ITEP-225, 320)
Class 3, Lab 2, Credit 4
ITEE-472 Telecommunication Concepts
Registration #0609-472
This course introduces the student to digital modulation, multiplexing, microwave, and communications concepts. The time and frequency domains of different types of digital modulation and multiplexing are studied in the laboratory with spectrum analyzers. Data communications and protocols are reviewed and examined in the laboratory with protocol analyzers. Software is used to display the various types of digital modulation, eye diagrams, and vector displays. (ITEE-363, 231, or ITEE-301)
Class 3, Lab 2, Credit 4

ITEE-473 Transmission Systems
Registration #0609-473
Fundamentals of transmission systems are introduced. Different types of transmission systems such as coaxial, fiber optic, microwave, and satellite systems are studied and compared. At the end of this course students should be able to choose the most efficient and cost effective transmission medium for communication circuits and be able to design the links based on the data to be transmitted and the environment. (ITEE-472)
Class 3, Lab 2, Credit 4

ITEE-474 Voice Communications: Principles and Technology
Registration #0609-474
Provides an understanding of basic telephony concepts and associated voice-based applications. Various telephone architectures are studied. Topic highlights include audiotext, ISDN (Integrated Service Digital Networks), and voice mail. Practical assignments emphasize "real-world" applications. (ITEE-271, ICSA-200)
Class 3, Lab 2, Credit 4

ITEE-475 Switching Technologies
Registration #0609-475
To familiarize the student with the various switching methods and equipment used in the telephone network. Voice and data switching methods such as matrix, circuit, message packet, burst, and LAN are studied and compared. The function of the switch in the network and network routing methods are examined. Voice and data traffic on a portable switch are simulated in the laboratory. (ITEE-474, SMAM-309)
Class 4, Credit 4

ITEE-476 Digital Communication Systems
Registration #0609-476
Provides an introduction to digital communication theory with an emphasis on voice application, voice digitalization, digital transmission, and video transmission. Types of modulation techniques studied are frequency and phase shift keying, pulse code modulation, and delta modulation. These techniques are implemented in the laboratory. (ITEE-472)
Class 3, Lab 2, Credit 4

ITEE-477 Data Communication Technology
Registration #0609-477
Provides a practical overview of data communications environment, historical evolution, technology, and applications. Topic highlights include networking concepts, cellular/mobile communications, FDDI (fiber distributed data interface), and digital-fiber networks and applications. (ICSA-411 or ITEE-472)
Class 3, Lab 2, Credit 4

ITEE-480 Telecommunications Policy and Issues
Registration #0609-480
This course provides an introductory overview of domestic and global information/telecommunications policy, standards, and regulation. Topic highlights include the European Unification, the automatic number identification (ANI)/call ID (CID) debate, privacy in the information age, transborder flow of information and security, and Personal Communications Network (PCN) standards. (ITEE-271)
Class 4, Credit 4

ITEE-499 Cooperative Education
Registration #0609-499
One quarter of appropriate work experience in industry. (ITES-099)
Credit 0

ITEE-520 Electrostatic and Magnetic Fields
Registration #0609-520
Basic principles of electrostatic and magnetic fields including vector analysis, Coulomb's law, field intensity, Gauss's law, energy and potential gradient, conductors, dielectrics, capacitance, Biot-Savart law, Ampere's circuit law, Stokes's theorem, magnetic flux density, force on current element and magnetic boundary conditions. (SMAT-422)
Class 3, Recitation 2, Credit 4

ITEE-524 Microwave Systems
Registration #0609-524
Microwave power sources, waveguide transmission systems, measurement of standing waves, impedance, Smith charts, power flow in waveguides, solid state microwave devices, microwave antennas and microwave communication system design are discussed. (ITEE-520)
Class 3, Lab 2, Credit 4

ITEE-534 Analog Communication Systems
Registration #0609-534
The Fourier Series is reviewed, and the Fourier Transfer is introduced. Circuit design and systems concepts for AM, DSB, SSB, VSB, and FM of each type of modulation is determined. The noise figure, noise temperature, and signal-to-noise ratio of a system is explained. (SMAT-423)
Class 3, Lab 2, Credit 4

ITEE-535 Telecommunication Systems
Registration #0609-535
Various types of digital and data communication systems and their components are studied. Digital communication modulation schemes and transmission techniques are introduced. Data communication concepts such as protocols, error control, transmission methods, coding, and circuit configurations are explained. Microwave radio and satellite communication systems concepts are studied with software in the laboratory. (ITEE-534 or knowledge of basic electronic communication concepts such as AM/FM transmission, tuned circuit and filter concepts, and basic digital theory)
Class 3, Lab 2, Credit 4
ITEE-538  Digital Computer Design I  
Registration #0609-538

An advanced course in the design of digital systems. The top-down design method is used in the study of complex combinatorial and sequential logic circuits. Use of MSI circuits including multiplexers, demultiplexers, shift registers, counters, and comparators is discussed. Programmable Array Logic Devices—PALs—are also used in the design process. Course covers both synchronous and asynchronous design and timing problems that are inherent to them. The Logic Workbench software package will be used as part of the design process. (ITEE-424)

Class 3, Lab 2, Credit 4

ITEE-539  Digital Computer Design II  
Registration #0609-539

Application of logic circuits to computer design. CPU structures and developments are introduced. Semiconductor memories, including RAM, ROM, and PROM, input/output circuits and their application to computers and microprocessors are considered. The basic operation of computer and microprocessor systems are examined. Programming requirements from microcode to modern languages are presented in light of the circuits and concepts presented in this course.

Class 3, Lab 2, Credit 4

ITEE-542  Microprocessors  
Registration #0609-542

An intermediate course in microprocessors emphasizing either the Motorola 68HC11 microcontroller or the Intel 8085 microprocessor. 8085 topics covered include the CPU, ROMs, RAMs, and programmable interfacing ICs. Assembly language programming is used on the 68HC11. (ITEE-424, ITEE-437)

Class 3, Lab 3, Credit 4

ITEE-543  Peripherals and Interfacing  
Registration #0609-543

A study of the most common peripherals used with microprocessors and minicomputers. Peripherals include UARTS, IC timers, TTYs, modems, CRT drivers, disc drives, line printers, and D/A and A/D converters. Methods of interfacing these peripherals to minicomputers and microprocessors are emphasized. Advanced topics in microprocessors will also be considered. (ITEE-539 and ITEE-542 or permission of the instructor)

Class 3, Lab 3, Credit 4

ITEE-547  Digital Processing of Signals  
Registration #0609-547

Basic concepts of linear systems are covered, followed by an introduction to digital signal processing. Emphasis is placed on digital filter design and digital spectral analysis. Significant programming projects are assigned. (SMAT-423)

Class 4, Credit 4

ITEE-550  Power Systems I  
Registration #0609-550

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 impedances, voltage regulation of transformers, and the per unit system are studied. The symmetrical component method of analysis is introduced. (ITEE-337, 411, or 414)

Class 3, Recitation 2, Credit 4

ITEE-551  Protective Relaying  
Registration #0609-551

The physical construction and characteristics of electromechanical relays, short circuit calculation and line, bus, transformer and motor generator protection are studied. Solid state relays, instrument transformers, and telecommunications and supervisory control are included. (ITEE-402, ITEE-550, or equivalent)

Class 4, Credit 4

ITEE-552  Power Systems II  
Registration #0609-552

The symmetrical component method of three-phase circuit analysis is used for fault analysis. Lightning and surge protection, load flow, economic operation, and system stability are covered. System protection is introduced. (ITEE-550, 411, 414, or permission of instructor)

Class 3, Recitation 2, Credit 4

ITEE-554  Electronic Optic Devices  
Registration #0609-554

An introductory course in the basics of optoelectronics. Basic optics is reviewed. Topics covered include the introduction to optics, lenses and optical systems; light sources and transmitters; modulation; light detectors and receivers; fiber optics, and lasers. (ITEE-442)

Class 3, Lab 2, Credit 4

ITEE-560  Electronics I  
Registration #0609-560

Fabrication techniques of bipolar devices are presented: crystal growth, oxide growth, lithography, diffusion, epitaxy, ion implantation, and metallization. The physical basis of semiconductor operation is introduced along with IC transistor design considerations.

Class 3, Recitation 2, Credit 4

ITEE-561  Microelectronics II  
Registration #0609-561

The fabrication techniques of MOS/CMOS devices are presented along with the physical basis of their operation and use in IC devices. VLSI design procedures using MOS devices are introduced and developed. (ITEE-560)

Class 3, Recitation 2, Credit 4

ITEE-565  16-Bit Microprocessors  
Registration #0609-565

A study of 16-bit microprocessors, emphasizing the Motorola 68000 and the Intel 8086. The architecture, instruction set, and programming of these microprocessors will be discussed. Input/output, interrupts, and exception processing will also be considered. (ITEE-542 or equivalent)

Class 3, Lab 3, Credit 4

ITEE-571  Network Engineering  
Registration #0609-571

This course uses local area networks (LAN) to study design issues for communication networks. Design issues studied are topologies, transmission media, interfaces and standards. A LAN is implemented in the laboratory. (ITEE-472,477)

Class 3, Lab 2, Credit 4
ITEM-572 Network Management Registration #0609-572
Provides an intensive practical experience in network management. The technical and management issues associated with the administration of complex, highly integrated networks are examined using various hardware and software tools. Case studies and lab-based assignments emphasize "real world" experience. (ITEC-474, 477)

Class 4, Credit 4

ITEM-574 Network Planning and Design Registration #0609-574
This advanced course exposes the student to the practical aspects of network design. Network design, simulation, and diagnostics form the laboratory experience for participants. The emphasis is on providing the student with hardware and software design skills applicable across a multi-vendor environment. (ITEC-572, 477)

Class 3, Lab 2, Credit 4

ITEM-580 Senior Project Registration #0609-580
Selected independent study of design project by electrical technology students with the approval of the department. Approval must be granted first week of fall or winter quarter for spring quarter registration.

Class/Lab as required. Credit 4

Mechanical Engineering Technology

ITEM-101 Freshman Seminar Registration #0610-101
A seminar course for incoming freshmen in the Mechanical Engineering Technology and Manufacturing Engineering Technology programs. Course will include discussions, presentations, field trips, and student activities that will help students become familiar with RIT resources, adjust to college and college-level course work, and identify career interests. Students will practice communication skills, work in teams, and discuss issues such as values, diversity of cultures, and stress.

Class 1.5, Credit 1

ITEM-200 Mechanical Blueprint Reading Registration #0610-200
This course involves the study of mechanical detail and assembly drawings. Topics include sketching, orthographic projections, and section views. The course will emphasize dimensioning practices, including geometric dimensioning and tolerancing used on detail and assembly drawings.

Lecture 1, Lab 2, Credit 2

ITEM-211 Introduction to Materials Registration #0610-211
This course provides a survey of engineering materials and how they are matched to the service requirements of the component. Emphasis will be on metals—their structure, properties, and applications. (ITEM-304 concurrently)

Class 3, Credit 3

ITEM-212 Metrology Registration #0610-212
A course dealing with precision measurements as applied to the manufacturing processes. Gaging of dimensions, surfaces, and contours by various techniques are among the topics covered. (ITEC-210)

Class 1, Lab 2, Credit 2

ITEM-220 Mechanical Design Drawing Registration #0610-220
A course dealing with the preparation of working drawings and their relation to actual production. Emphasis is placed on dimensioning and tolerancing, both conventional and geometric, along with sectional views and thread fasteners. (ITEC-210)

Class 2, Lab 4, Credit 4

ITEM-302 Introduction to Statics Registration #0610-302
An introduction to statics covering forces, moments, vectors, equilibrium, friction, areas, volumes, and masses. (SPSP-211)

Class 4, Credit 4

ITEM-303 Strength of Materials Registration #0610-303
An introduction to the effect of external forces on the behavior of solid materials. Stresses, strains, Hooke's law; thermal effects are studied with consideration of axial, torsional, and bending loads, by themselves and in combination. (ITEM-302)

Class 4, Credit 4

ITEM-304 Materials Testing Registration #0610-304
A laboratory course dealing with standard physical tests of various materials, instrumentation used in these tests, and the preparation of laboratory reports. (ITEM-211 concurrently)

Class 0, Lab 2, Credit 1

ITEM-305 Pneumatic and Hydraulic Systems Registration #0610-305
The study of the basics of fluid power. Areas of study are pressure, viscosity, turbulence, flow, thermal properties, and displacement. Hydraulic/pneumatic components such as pumps, actuators, valves, accumulators, lines, directional controls, sealing devices, servomechanisms, hydraulic fluids, and fluid containers will be studied. (ITEM-302)

Class 3, Lab 2, Credit 4

ITEM-306 CAD Applications in Mechanical Design I Registration #0610-306
This is an applications course in CAD which uses the fundamental concepts and software studied in Introduction to CAD, CAD I and CAD II. Instruction will be provided in geometric dimensioning and tolerancing. Laboratory exercises will emphasize machine component design problems. (ITEF-260 or 261)

Class 2, Lab 4, Credit 4

ITEM-307 CAD Applications in Mechanical Design II Registration #0610-307
This is the second of a two-course sequence in CAD applications. Students will have the opportunity to improve their CAD skills by solving more extensive problems. Instruction will be provided in statistical tolerancing. Laboratory exercises will emphasize machine design problems. (ITEM-306)

Class 2, Lab 4, Credit 4

ITEM-308 Kinematics Registration #0610-308
A study of basic kinematics, using analytical, graphical, and computer-aided techniques. Kinematics analysis of mechanisms and machine components. The design of cams, gear trains, linkages, flexible machine elements, hydraulic mechanisms. Case studies of mechanisms. (ITEM-303)

Class 3, Lab 2, Credit 4
ITEM-315 Principles of Mechanical Design I
A course in mechanics of materials as applied to mechanical design. Principles of deflection, stress, bending, and torsion in parts. Working stresses and failure in parts. Design of shafts, springs, screws. (ITEM-308)
Class 4, Credit 4

ITEM-316 Principles of Mechanical Design II
Mechanical design of machine components—clutches, brakes, lubrication, ball and roller bearings, spur gears. (ITEM-315)
Class 4, Credit 4

ITEM-318 Materials Technology II
A study of corrosion, plastics, and composite materials as related to mechanical design. Laboratory activities related to corrosion, plastic processing, testing and property evaluation. (ITEM-211, ITEM-304)
Class 3, Lab 2, Credit 4

ITEM-320 Fluid Power Systems
Introduction to pneumatic and hydraulic components; pneumatic and hydraulic power systems; compressors, pumps, efficiency, and applications; integrated electromechanical power systems. Lab sessions develop a qualitative feel for characteristics and applications of power systems, machines, and their control.
Class 3, Lab 2, Credit 4

ITEM-330 Computation Methods in MET
Applications of computing methods to the solution of typical mechanical technology problems using RIT academic computing system and personal computers. Concepts of BASIC language are presented with student writing programs to solve specific technical problems. Topics consist of both fundamentals of programming and mechanical technology applications. (Prerequisite ITEM-302, SPSP-212; corequisite ITEM-303)
Class 3, Lab 2, Credit 4

ITEM-351 Electro-Mechanical Systems Design
Concepts, principles, and analysis of components used in the design of control systems. This includes electrical, mechanical, thermo, and fluid system components. The analysis of control types and stability of various control systems are also presented. (ITEE-337, ITEM-303)
Class 3, Lab 2, Credit 4

ITEM-399 Independent Study
A supervised investigation within a mechanical technology area of student interest. Consent of the instructor and departmental approval are required.
Credit 1-8

ITEM-404 Applied Mechanics of Materials Design
The basic concepts of strength of materials as applied to mechanical design are reviewed in depth. The course includes the study of the concepts of stress and strain, the stress-strain relationship, and combined stress. Fatigue and properties of materials and analysis of mechanical fatigue, theories of failure. Application of these concepts to the analysis of machine members. (ITEM-303, SMAT-420 concurrently)
Class 3, Recitation 2, Credit 4

ITEM-405 Applied Dynamics
This is a course in the fundamentals of kinematics and kinetics of motion. Kinematics is the study of the geometry of motion. Kinetics relates the forces on objects to their resulting motion. This includes the study of Newton's Laws of Motion and energy methods. (ITEM-404, SMAT-421, or concurrent)
Class 3, Recitation 2, Credit 4

ITEM-406 Dynamics of Machinery
A study of the kinematics of machine elements including gear trains, cams and linkages. Applications in robotics mechanisms are studied. Both graphical and computer methods are used. (ITEM-405 and 432)
Class 3, Lab 2, Credit 4

ITEM-407 Mechanical Engineering Technology Laboratory I
A course in mechanical laboratory techniques and the preparation of laboratory reports; experimental work in strength of materials, experimental stress analysis and dynamics. Instruction in the preparation of laboratory reports. (ITEM-405 and 432 concurrently)
Class 2, Lab 2, Credit 2

ITEM-408 Introduction to Strength of Materials
Elements of statics and strength of materials. Topics include plane equilibrium, friction, stress, strain, torsion, and the bending of beams. Offered as a service course to electrical engineering technology students. (SPSP-211)
Class 4, Credit 4

ITEM-409 Mechanical Engineering Technology Laboratory II
A course in laboratory techniques, the analysis of experimental results and the preparation of laboratory reports. Experimental work in materials science and plastics technology will be conducted with special emphasis on plastics technology. (SCHG-271; ITEM-416 concurrently)
Class 1, Lab 3, Credit 2

ITEM-416 Materials Technology
Topical areas of study include corrosion reactions, corrosion prevention, properties and structure of plastics, an overview of plastics processing, the nature of adhesives and adhesive bonding, properties of composite systems, and ceramics properties and structure. (SCHG-273, ITEM-211)
Class 1, Credit 1 Class 2, Lab 4, Credit 4
ITEM-432 Computers in Mechanical Technology
Registration #0610-432
The use of computers to solve problems encountered in mechanical engineering technology will be emphasized. This will include an introduction to the RIT academic computing system and introduction to the use of personal computers. Instruction will be provided in word processing, spread sheet programming, plotting and other applications programs. Assignments will be based on problems encountered in mechanics of materials, dynamics, materials testing, energy analysis, etc.
Class 1, Lab 2, Credit 2

ITEM-440 Applied Thermodynamics I
Registration #0610-440
The first and second laws of thermodynamics and their applications in mechanical engineering technology. Thermodynamic properties of fluids including ideal gases and pure substances are studied. Thermodynamic processes and applications of thermodynamic principles to steam cycles and refrigeration cycles. (ITEM-405, SMAT-421)
Class 4, Credit 4

ITEM-441 Thermodynamics and Heat Transfer
Registration #0610-441
The first and second laws of thermodynamics and their applications. Thermodynamic properties of fluids, including ideal gases and pure substances, are studied. Introduction to heat transfer by conduction, radiation, and convection. Selection of heat exchangers. (SMAT-420)
Class 4, Credit 4

ITEM-442 Heat Transfer
Registration #0610-442
The first course in heat transfer. The theory and application of the fundamentals of heat conduction, convection, and radiation. The design and applications of heat transfer-apparatus. (ITEM-440, ITEM-460, and SMAT-422)
Class 3, Lab/Recitation 2, Credit 4

ITEM-451 Vibration and Noise
Registration #0610-451
A study of the basic concepts of vibration and noise. Designing equipment for survival in vibration and shock environments. Methods of reducing noise in machinery structures. Environmental tests for vibration and shock. Methods of vibration and noise analysis will be demonstrated. (SMAT-422, ITEM-405)
Class 4, Credit 4

ITEM-460 Applied Fluid Mechanics
Registration #0610-460
A study of the fundamentals of fluid statics and dynamics. Principles and applications of fluid statics, fluid kinematics, fluid kinetics, the energy conservation principle, dimensional analysis, and fluid momentum. Also covered are laminar and turbulent flow in pipes and products, fluid machinery, fluid meters, and lifting vanes. (ITEM-440)
Class 3, Recitation 2, Credit 4

ITEM-465 Thermo-fluid Laboratory
Registration #0610-465
Laboratory experiments in thermodynamics, fluid mechanics and heat transfer. Special emphasis is placed on report preparation and computer-aided data reduction. (ITEM-440, 460)
Class 1, Lab 3, Credit 3

ITEM-499 Cooperative Education
Registration #0610-499
One quarter of appropriate work experience in industry. (ITES-099)
Credit 0

ITEM-506 Machine Design I
Registration #0610-506
The study of static and fatigue failure of machine elements and the design and analysis of fasteners, springs, and spur gears. (ITEM-405, 432)
Class 3, Lab/Recitation 2, Credit 4

ITEM-508 Machine Design II
Registration #0610-508
The study of selected topics such as bearings, helical, bevel and worm gears, belts, chains, clutches and brakes. Computer applications are presented for many of the topics studied. (ITEM-506)
Class 3, Lab/Recitation 2, Credit 4

ITEM-509 Product Design
Registration #0610-509
Integrates the product development and design process with materials, manufacturing methods, process planning, assembly, testing, reliability, and quality assurance. Special emphasis will be placed on part design and the assembly operation. Students will learn how to reduce material costs, part costs, assembly time, and the number of parts. (ITEM-506, 508)
Class 3, Lab/Recitation 2, Credit 4

ITEM-512 Computer Integrated Mechanical Design
Registration #0610-512
The use of computers in solving mechanical design problems will be emphasized. This will include introduction of data manipulation, plotting, graphics, applications programming, and finite element analysis. (ITEM-432, 506)
Class 3, Lab 2, Credit 4

ITEM-515 Plastics Processing Technology
Registration #0610-515
A course of dealing with the various methods used to manufacture plastics products. Topics include compression molding, rotational molding, extrusion, injection molding, blow molding, and thermoforming. (Fourth-year status)
Class 4, Credit 4

ITEM-516 Plastics Product Design and Material Selection
Registration #0610-516
The study of design guidelines for plastics products based on the interrelationships between product design, the material selected, the manufacturing process selected, and the tooling to be used. (ITEM-515 or permission of the instructor)
Class 4, Credit 4

ITEM-530 Instrumentation
Registration #0610-530
The basic approach to the design and use of pressure, temperatures, flow, humidity and liquid level measurement instrument transducers. Techniques of test, calibration, and proper use will be demonstrated. Principles of experimentation and computerized data reduction are examined. (ITEE-411, ITEM-460, SMAT-422)
Class 3, Lab 2, Credit 4
ITEM-535  Analog Control Systems
Registration #0610-535
The course provides students with an overview of analog feedback control systems. Students are introduced to topics such as block diagrams, classification of control types, mathematical models, measuring means, and LaPlace Transforms. Control systems will also be discussed. Lab demonstrations will be presented. (ITEM-460, SMAT-422)
Class 4, Credit 4

ITEM-540  Applied Thermodynamics II
Registration #0610-540
Application of thermodynamics to internal combustion engines, compressors, steam cycles, refrigeration, air conditioning, psychrometrics and combustion processes. (ITEM-440, 460)
Class 4, Credit 4

ITEM-541  Alternative Energy Applications
Registration #0610-541
The major emphasis of this course is in the area of solar energy—system design of solar hot water and space heating systems and solar-assisted heat pumps. Other alternative sources of energy are also discussed such as wind energy and solid waste. (ITEM-442)
Class 4, Credit 4

ITEM-542  HVAC System Engineering
Registration #0610-542
Principles and applications of refrigeration, air conditioning, comfort heating, and ventilating. Thermodynamics of air conditioning, psychrometrics, moisture calculations; also related heat transfer topics. (ITEM-460 concurrently)
Class 4, Credit 4

ITEM-543  Energy Management I
Registration #0610-543
Technical, management, and cost aspects of energy conservation. Technical aspects of reducing energy consumption in utilities, processes, buildings, heating, air conditioning, and ventilation systems. Special topics such as furnace efficiency, heat recovery, heat pumps, pumping and piping, and architectural considerations. (ITEM-540 or permission of instructor)
Class 4, Credit 4

ITEM-544  Energy Management II
Registration #0610-544
Technical, management, and cost aspects of energy conservation. Technical aspects of reducing energy consumption in utilities, processes, buildings, heating, air conditioning, and ventilation systems. Special topics such as combustion efficiency, heat recovery, heat pumps, pumping and piping, and architectural considerations. (ITEM-543)
Class 4, Credit 4

ITEM-545  Solar Thermal Applications
Registration #0610-545
Study of analytical methods to model and predict the performance of solar energy systems. The emphasis will be on the application and design of systems appropriate for the available technology. Additional areas of study include the economic feasibility and analysis of potential solar energy applications, selection of appropriate equipment based on the energy value and economic-based adjustment of system designs derived from technical performance optimizations. (ITEM-440)
Class 4, Credit 4

ITEM-546  Advanced HVAC Systems
Registration #0610-546
This course covers the thermodynamic analysis of air conditioning processes, especially with regard to equipment components such as coils, humidification apparatus, fans, and compressors. The methods of modeling the dynamic thermal performance of buildings are studied. Topics related to the influence of solar energy and light on the design of buildings are studied. The thermofluid analysis of pipe flow and air flow in ducts is also covered. (ITEM-542)
Class 4, Credit 4

ITEM-570  Robust Design
Registration #0610-570
The fundamental principles of robust design are developed, and the history of the robust design engineering methodology is presented. The concepts of loss function, concept selection, parameter design, and tolerance design will be covered in detail. A structured design engineering methodology is taught with strict attention to the importance of linking engineering knowledge to Taguchi’s approach to designed experiments. Metrics and analysis techniques are developed to optimize the performance of product or process components in spite of the variability of their design, manufacturing, or customer-use environments. Specific attention will be paid to case studies to reinforce the students’ conceptualization of the methods and their focus on engineering of optimized products and processes. (Fifth-year status or department approval)
Class 4, Credit 4

ITEM-580  Power Plant Design
Registration #0610-580
Description of power plants and their components; boilers, turbines, pumps, condensers, heat exchangers, nuclear reactors. Relevant analytical tools; cycle calculations, heat balances, gas analysis, fuel analysis. Also, internal combustion power plants and cogeneration plants are covered. Field trips demonstrate state-of-the-art power technologies. (ITEM-460)
Class 3, Lab/Recitation 2, Credit 4

ITEM-599  Independent Study
Registration #0610-599
A supervised investigation within a mechanical technology area of student interest. (Permission of instructor and departmental approval are required.)
Credit variable (1-4)

Manufacturing Engineering Technology

ITEM-200  Survey of Manufacturing Engineering Technology
Registration #0617-200
The course will provide a broad survey of computer-aided design. It will include the role of design in manufacturing, automation of design functions, CAD systems, functions and components of CAD, integration of CAD with other manufacturing systems, and a survey of CAD systems in the market.
Class 2, Credit 2

ITEM-220  Manufacturing Processes I
Registration #0617-220
This course will introduce the student to basic metal cutting machine tool operation, proper machining practices and cutting tool selection. Hands-on experience will be emphasized through lathe, milling machine, drill press, band saw, grinder and precision layout work. The course will provide the student with the knowledge and the "how-to-do" skills of manufacturing. (ITEC-210)
Class 3, Lab 3, Credit 4
ITEF-260 Introduction to CAD
Registration #0617-260
This is a first course in CAD. It introduces the basic concepts in automated drafting and design. The course will be taught with the help of a PC-based CAD system. (ITEC-210)
Class 3, Lab 2, Credit 4

ITEF-261 Introduction to Computer Aided Drafting-A
Registration #0617-261
The purpose of this course is to develop a set of working drawings with advanced system commands. Flowcharting and file management techniques will be required as supporting documentation for each project. This course will also include the digitizing board as an electronic input device for existing drawings and/or sketches. (ITEC-210 or equivalent)
Credit 4

ITEF-271 Introduction to Numerical Control
Registration #0617-271
The philosophy of the use of numerical control in manufacturing. The course will review manual programming, examine different applications of numerical control, and introduce computer-assisted programming techniques. N/C machine tools will be demonstrated.
Credit 4

ITEF-272 Tool Design
Registration #0617-272
The design of special tooling, jigs, and fixtures for economic production. The principles of positioning, locating and clamping are studied along with the analysis of cutting forces. Also covered are tools for inspection and gauging. (ITEF-220)
Credit 4

ITEF-330 Introduction to Computer Integrated Manufacturing
Registration #0617-330
The course provides an overview of the various technologies used to accomplish and integrate the manufacturing functions. It deals with such technologies as CAD, CNC, GT, MRP, JIT, SPC, PLCs, robotics, vision, and others and how they are used to integrate the manufacturing functions in an organization. (ITEF-220, 260)
Class 3, Lab 2, Credit 4

ITEF-331 Programmable Logic Control Systems
Registration #0617-331
This course deals with the principles and application of programmable logic controllers. Topics include PLC hardware, programming, and application of PLCs.
Class 3, Lab 2, Credit 4

ITEF-372 CAD Applications to Tool Design
Registration #0617-372
This course deals with the design of tools used in the manufacturing processes. The course will employ a CAD system for design purposes. (ITEF-260)
Class 3, Lab 2, Credit 4

ITEF-375 Introduction to Computer-Aided Manufacturing
Registration #0617-375
This is the first course in computer-aided manufacturing, and deals with the concepts in distributed numerical control systems. It provides hands-on experience in the automatic fabrication of parts designed in a CAD System. (ITEF-260)
Class 3, Lab 2, Credit 4

ITEF-391 Production Control
Registration #0617-391
This course prepares the student to deal with production planning algorithms and inventory control models. Subjects such as forecasting, inventory control techniques, production planning and scheduling and material requirements planning will be presented.
Credit 4

ITEF-403 Machine Elements
Registration #0617-403
This course covers the basic principles that apply to the design and selection of such frequently used machine elements as bearings, shafts, fasteners, variable speed drives, gears, cams and springs. Emphasis will be given to applications for manufacturing equipment.
Class 2, Recitation 2, Credit 3

ITEF-405 Materials in Manufacturing
Registration #0617-405
A course dealing with the materials used in modern manufacturing processes. Topics include metals, composites, plastics, and the selection of manufacturing materials from the point of view of design and manufacture.
Class 4, Credit 4

ITEF-410 Computers in Manufacturing
Registration #0617-410
A course dealing with the use of computers in the manufacturing environment. It will cover data acquisition and control and application of controls for manufacturing process integration. The course will be taught using a high-level programming language. It will also deal with the concepts of networking and distributed systems. (Any high-level language, such as Basic or Fortran)
Class 2, Lab 2, Credit 3

ITEF-420 Manufacturing Processes II
Registration #0617-420
A comprehensive course in metal manufacturing processes. Topics include metal solidification processes, bulk deformation processes, sheet-metal working processes, particulate processing, machining, and joining processes. The course will address the processes from the point of view of "how," "why" and "under what conditions." Emphasis will be placed on the laboratory projects.
Class 3, Lab 3, Credit 4

ITEF-424 Statistical Quality Control I
Registration #0617-424
The basic concepts of statistics and probability are studied as they apply to quality control and reliability. Included are the study of control charts and sampling procedures and work measurement.
Class 4, Credit 4

ITEF-425 Statistical Quality Control II
Registration #0617-425
This is an advanced course in quality control. The course will cover in detail the following aspects: Process Control Techniques involving X charts, R charts, P charts, NP charts, and Acceptance Sampling techniques involving MIL-STD 105D, MIL-STD 414, and other MIL-STDs. (SMAM-309)
Class 3, Credit 3
Operations Management  
ITEF-434 Registration #0617-434  
A study of modern manufacturing organization and how it is managed. The course will cover manufacturing systems design, analysis, and control. Techniques of decision making process, design of manufacturing process, materials handling, design of physical facilities, and control of manufacturing operations will be discussed.  
Credit 4, Class 4

Engineering Economics  
ITEF-436 Registration #0617-436  
The course deals with techniques required to make economic decisions. Topics covered in the course include cash flow analysis, present worth analysis, annual worth comparisons, rate of return evaluations, benefit cost analysis, breakeven analysis, replacement evaluations, bonds, and the effect of taxes on cash flows.  
Class 4, Credit 4

Value Analysis  
ITEF-437 Registration #0617-437  
The course presents the techniques involved in analyzing products from the point of view of value and cost. It is a project oriented course where students select and solve real world problems. The techniques covered in the course include team building, project selection, brainstorming, Gordon techniques, attribute listing, morphological analysis, functional analysis, value index, paired comparisons, magnitude estimation, criteria analysis, and cost estimation. It also analyzes the role of VA in product design for manufacturing.  
Class 3, Credit 3

Plastics Processing  
ITEF-450 Registration #0617-450  
A course dealing with the various methods used to manufacture plastics products. Topics include compression and rotational molding, extrusion, injection molding, blow molding, thermforming, pre- and post-molding operations and economics of plastics processing.  
Class 3, Lab 2, Credit 4

Computer-Aided Design  
ITEF-460 Registration #0617-460  
The course introduces CAD as an integral part of Computer Integrated Manufacturing. It deals with the basic concepts in CAD, the hardware and software related to 2D and 3D interactive graphics, CAD applications, the relationship between CAD and CAM, and the economics of CAD. The course concentrates on the CAD functions involving geometric modeling, finite element analysis, and drafting. Emphasis is placed on the laboratory work involving turn-key systems for 3D wire frame modeling and 3D solids modeling.  
Class 3, Lab 2, Credit 4

Controls for Manufacturing Automation  
ITEF-470 Registration #0617-470  
The course deals with the principles and application of programmable logic controllers. Topics include PLC hardware, programming, and application of PLCs in the manufacturing environment. (ITEE-411)  
Class 2, Lab 2, Credit 3

Computer Numerical Control  
ITEF-471 Registration #0617-471  
An advanced course in the application of numerical control. Emphasis is placed on computer-assisted part programming for contouring in two and three axes. The course will concentrate on N/C programming with APT. (ITEF-420 or Manufacturing Processes)  
Class 2, Lab 2, Credit 3

Tool Engineering  
ITEF-472 Registration #0617-472  
An advanced course dealing with manufacturing tools. Examines concepts in tool design, tool specification and tool selection. Emphasis is on the design of dies. (ITEF-220, 420)  
Class 2, Lab 2, Credit 3

Computer-Aided Manufacturing  
ITEF-475 Registration #0617-475  
A course dealing with the process aspects of Computer Integrated Manufacturing systems. Introduces the various elements of CIM and concentrates on the role of CAM in CIM. Deals with the concepts and application of Group Technology, Computer-Aided Process Planning, and Flexible Manufacturing Systems. Includes the relationships between CAD, CNC, Robotics, MRP and CAM. Emphasis is placed on building mini CAM systems in the laboratory. (ITEF-470, 471, 485, ITEE-413)  
Class 3, Lab 2, Credit 4

Work Simplification and Measurement  
ITEF-481 Registration #0617-481  
Principles and application of basic methods for the improvement of productivity and production environment. Methods of measuring and analyzing work, motion studies, process analysis, and productivity improvement are covered.  
Class 3, Credit 3

Robots in Manufacturing  
ITEF-485 Registration #0617-485  
A course dealing with the technology and application of robotics. Included are the study of hardware and software of robots and the integration of robots with other elements of Computer Integrated Manufacturing (CIM) systems. The hardware aspects will include the mechanical components, the power systems, the control units, and the sensors. The software aspects will cover the various methods of programming the robots and interfacing them with other components of CIM. The integration aspects include the potential areas of application of robots and their economics. (ITEF-470, ITEE-413)  
Class 3, Lab 2, Credit 4

Production Control  
ITEF-491 Registration #0617-491  
Fundamentals of production and inventory control concepts are presented. Major portion of the course is devoted to the principles and the application of MRP. Deals with the inventory control theories, forecasting, master production schedules, bill of materials, lead times, order points, gross to net procedures, and production schedules.  
Class 4, Credit 4

Manufacturing Technology Co-op  
ITEF-499 Registration #0617-499  
One quarter of appropriate work experience in industry. (ITEE-099)  
Credit 0
ITEF-502 Non-Traditional Manufacturing Processes
Registration #0617-502
A course dealing with precision machining using non-traditional processes. Includes such processes as electric discharge machining, electro-chemical machining, chemical milling, laser beam machining, electron beam machining, ultrasonic machining, water jet cutting, abrasive flow machining and plasma arc machining.
Class 3, Credit 3

ITEF-510 Process Design
Registration #0617-510
Project-oriented independent course. Presents an opportunity for the student to apply the knowledge gained in the program. The student is expected to design and build a system and demonstrate its operation. May include oral and written reports. (ITEF core or instructor's consent)
Class 1, Recitation 4, Credit variable 3-4

ITEF-526 Quality Systems
Registration #0617-526
Study of quality-related aspects from design of products to providing maintenance services in the field. Students are presented with case studies for analysis and problem solving.
Class 3, Credit 3

ITEF-530 Special Topics in Computer Integrated Manufacturing
Registration #0617-530
An advanced course covering various problems faced by the industry in computer integrated manufacturing. Topics will include design for assembly, problems in design analysis, incompatible system components, hardware and software integration problems, universal standards, IGES, MAPS, hardware and software related problems in feedback devices and management and personnel problems. (ITEF-485 or permission of instructor)
Class 3, Credit 3

ITEF-599 Independent Study
Registration #0617-599
A supervised investigation within a manufacturing technology area of student interest. (Consent of the instructor and department approval)
Credit variable (1-8)

Computer Engineering Technology

ITEP-101 Freshman Seminar
Registration #0618-101
A seminar course for incoming freshmen in the Computer Engineering Technology Program. Course will include discussions, presentations, field trips, and activities that help students become familiar with RIT resources, adjust to college and college-level course work, and identify career interests. Students will practice communication skills, work in teams, and discuss issues such as values, diversity of cultures, and stress.
Class 1.5, Credit 1

ITEP-201 DC Circuits
Registration #0618-201
An introduction to DC circuit analysis techniques. Topics include resistance, inductance, capacitance, with circuit techniques of Ohm's Law, current-voltage division, simplification of series, parallel, bridge and ladder networks, Kirchhoff's Laws, Thevenin's and Norton's Theorem, Mesh and Nodal Analysis and Superposition. (Corequisite SMAM-204)
Class 3, Lab 2, Credit 4

ITEP-202 AC Circuits
Registration #0618-202
AC circuits and devices with topics of phasor algebra, reactance, impedance, AC power and power factor, resonance, maximum power transfer, frequency, band-width, and three-phase circuits. Use of the computer to solve and simulate circuit problems. (ITEP-201, corequisite SMAT-420)
Class 3, Lab 3, Credit 4

ITEP-220 Electronic Fabrication Techniques
Registration #0618-220
An introduction to the engineering technology field with emphasis on the skills that a student will need in a laboratory environment. The skills include electrical layout, prototyping, wire wrapping, and soldering. The fundamentals of printed circuit board fabrication and assembly will be discussed. (Corequisite ITEE-201)
Class 1, Lab 2, Credit 4

ITEP-225 Schematic Capture
Registration #0618-225
An introductory course in the use of an automated drafting tool for both digital and analog circuits. The course will teach the proper drawing techniques needed to prepare a schematic using a computer-aided drafting (CAD) tool. The GED Graphic Editor, of Valid Logic System's Electronic Design Automation software package, will be used as the CAD tool.
Class 1, Lab 2, Credit 2

ITEP-301 Digital Fundamentals
Registration #0618-301
A first course in digital fundamentals. Topics include binary arithmetic, Boolean algebra, logic gates, Karnaugh mapping, and an introduction to sequential logic. (ITEP-201)
Class 3, Lab 2, Credit 4

ITEP-303 Microcomputers
Registration #0618-303
A first course involving the hardware and structure of a basic microprocessor-based microcomputer. Emphasis will center on the hardware characteristics that dictate performance limitations, design considerations, and interfacing principles. The course will culminate in a small system design. (ITEP-301, ICSP-305)
Class 3, Lab 3, Credit 4

ITEP-310 Electronics I
Registration #0618-310
An introduction to electronic devices including semiconductor diodes, zener diodes and bipolar transistors. Emphasis will be on the characteristics, operation and biasing of these devices. Included is an introduction to the concept of amplification and use of the small signal parameters of the BJT in common-emitter and common-collector configurations. (ITEP-202, SMAT-420)
Class 3, Lab 3, Credit 4

ITEP-311 Electronics II
Registration #0618-311
A continuing course in the analysis and design of electronic circuits. Emphasis will be on the characteristics, operation and biasing of both junction and insulated gate field effect transistors and the use of small signal parameters. Included is an introduction to frequency response of circuits and the depiction of frequency response. (ITEP-310)
Class 3, Lab 3, Credit 4
ITEP-312  Electronics III  Registration #0618-312
A continuation course in the analysis and design of simple linear circuits for students who have completed the introductory course sequence in transistor amplifiers. Included is the analysis of multistage transistor amplifiers and the differential amplifier. Emphasis is on the operational amplifier and its applications. Topics include the ideal operational amplifier, non-ideal characteristics, summing amplifiers, and integrators. Also included is an introduction to special purpose electronic devices (SCR, TRIAC, LCD, etc.). (ITEP-311)
Class 3, Lab 3, Credit 4

ITEP-320  Principles of Electronic Design Automation  Registration #0618-320
This is an introductory course in design, capture, and validation of digital and analog circuit designs. The automation process will use Valid's EDA software package operating on a UNIX/SUN platform. (ITEP-301, 310, ICSP-241)
Class 2, Lab 4, Credit 4

ITEP-403  Advanced Circuit Theory  Registration #0618-403
An introduction to advanced circuit technique applicable to the electronic, microcomputer and instrumentation applications likely to be encountered by computer engineering technology graduates. Topics include Kirchhoff's Laws, Thevenin's and Norton's Theorems, ideal operational amplifier circuits (summing, non-inverting, integrating, differentiating), LaPlace Transforms of arbitrary time functions and of differential equations, circuit applications of LaPlace transforms, transfer functions, inverse LaPlace transforms by partial fractions for simple and repeated roots, both real and complex. Fourier series analysis is also covered. (ITEP-302 or 312, SMAT-422)
Class 3, Lab 2, Credit 4

ITEP-405  Control Theory  Registration #0618-405
A course in the fundamentals of linear control systems, as used from the standpoint of the digital computer. Emphasis on feedback control theory, control system components, digital control systems and solid state control. (ITEP-403)
Class 3, Lab 2, Credit 4

ITEP-429  Advanced Electronics  Registration #0618-429
A continuation of advanced circuit techniques applicable to the electronic, microcomputer and instrumentation applications likely to be encountered by computer engineering technology graduates, plus further, more detailed coverage of real operational amplifier circuits and related circuits. This includes comparators, sample and holds, regulators, analog to digital and digital to analog conversion and filters. Topics also include LaPlace solution of first-order step responses, phasors, pole-zero plots, graphical sinusoidal steady-state, and Bode plots. (ITEP-403)
Class 3, Lab 2, Credit 4

ITEP-499  Cooperative Education  Registration #0618-499
One quarter of appropriate work experience in industry and third-year status in computer engineering technology. (ITEP-303, ICSP-305; ITES-099)
Credit 0

ITEP-538  Digital Systems Design I  Registration #0618-538
An advanced course in the design techniques of complex combinational and sequential logic circuits and subsystems. Emphasis is on the use of systematic design procedures for implementing state machine designs. The internal structure and function of various logic gates and families are analyzed. The problems of interfacing various logic families are discussed. (ITEP-303, 310 or 203)
Class 3, Lab 3, Credit 4

ITEP-539  Digital Systems Design II  Registration #0618-539
A study of the design of complete digital systems using combinational and sequential subsystem circuit design and microprocessors. Included is the hardware design used in digital communications systems. Laboratory work is based around the designing, building and modifying of a multifunction microcomputer from individual components. Included are the hardware ramifications of software and operating system design, and small system architecture problems. (ITEP-538)
Class 3, Lab 3, Credit 4

ITEP-540  Digital Systems Design III  Registration #0618-540
An introduction to the design of complete digital control systems. A/D and D/A converters, Digital Control Theory and sensing devices are emphasized. (ITEP-405, 429, 539, ICSS-402)
Class 3, Lab 3, Credit 4

ITEP-557  Topics in Computer Engineering Technology  Registration #0618-557
A course for majors in computer engineering technology, with topics as needed for updating technology. Anticipated offerings may include topics in new programming languages, advanced microprocessors and microcomputer systems, and computer communications systems and techniques. (Fifth-year status in computer engineering technology is required.)
Class 3, Lab 3, Credit 4

ITEP-580  Senior Project  Registration #0618-580
Selected independent study design project by computer engineering technology students with the approval of the department. Approval must be granted first week of the fall or winter quarter for spring quarter registration. (Fifth-year status in computer engineering technology)
Class/Lab as required, Credit 4

School of Food, Hotel and Travel Management

ISMD-213  Contemporary Nutrition  Registration #0620-213
The study of specific nutrients and their functions; physiological, psychological, and sociological needs of humans for food; development of dietary standards and guides; application of nutritional principles in planning and analyzing menus for individuals of all ages; survey of current health nutrition problems and food misinformation.
Class 4, Credit 4
### ISMD-402  Dietetics Environment
**Registration #0620-402 Coordinated Dietetics Program**
Introductory clinical dietetics course. Students interact with a representative sampling of personnel in all areas of dietetics. Supervised observations are planned in food management systems, health care facilities and community nutrition programs.
Class 1, Credit 4, Practicum hours by arrangement

### ISMD-525,526  Advanced Nutrition and Diet Therapy I & II
**Registration #0620-525,526**
The applied study of metabolism and the interrelationships between nutrients and other biochemical substances in humans. Etiology, symptoms, treatment, and prevention of nutritional diseases; evaluation of nutritional status; role of the diet in gastrointestinal, renal, musculoskeletal, cardiac, endocrine, surgical, and other diseases.
ISMD-525 Class 5, Credit 5
ISMD-526 Class 4, Credit 4

### ISMD-550  Community Nutrition
**Registration #0620-550**
Study of current nutrition problems and delivery of nutrition information and service in the community. Survey of facilities involved in giving nutrition information or nutritional care. Emphasis on acquiring skills necessary for delivering nutrition information and services in traditional and non-traditional markets. Independent projects involving nutrition care in community facilities are required. Assignments are arranged by the instructor.
Class 3, Credit 8, Practicum hours by arrangement

### ISMD-551  Food Systems Management II
**Registration #0620-551 Coordinated Dietetics Program**
This is a supervised practice course providing practical learning experience in food systems management in a large health-care setting. Students observe, analyze, and practice. The theoretical basis for practice has been provided in courses throughout the sophomore and junior years.
Class 1, Credit 8, Practicum in hospital by arrangement

### ISMD-554  Nutrition in Life Cycle
**Registration #0620-554**
This is an applied course in nutritional needs throughout the life cycle. Emphasis will be 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.
Class 4, Credit 5, Practicum hours by arrangement

### ISMD-560,561  Clinical Dietetics I & II
**Registration #0620-560,561 Coordinated Dietetics Program**
An intensive integrated study and application of advanced nutrition and diet therapy theories and principles. The course is primarily structured to integrate class lectures with practicum experience in a hospital setting. Designed for senior students in the Coordinated Dietetics Program.
ISMD-560 Class 4, Credit 4
ISMD-561 Credit 4, Practicum hours by arrangement

### ISMD-562,563  Clinical Dietetics III & IV
**Registration #0620-562,563 Coordinated Dietetics Program**
A continuation of ISMD-560, 561 in the succeeding quarter with the practicum experience being conducted primarily in the hospital.
ISMD-562 Class 4, Credit 4
ISMD-563 Credit 8, Practicum hours by arrangement

### ISMF-220  Food Management
**Career Seminar**
Seminar designed to define career opportunities in the food, hotel, and travel industries. Students receive guidance in developing career objectives. Leading industry executives will participate.
Class 2, Credit 2

### ISMF-222  Introduction to Foodservice Management
**Registration #0621-222**
An introductory course to foodservice management, which presents an overview of trends, customer expectations, and operations shaping the industry. Topics will include elements of menus (as a management tool), nutrition, food safety and sanitation, purchasing, receiving, and storage. Emphasis will be on defining and identifying standards for quality food production and presentation.
Class 4, Credit 4

### ISMF-224  Decision Making in Foodservice Management
**Registration #0621-224**
Insights into the dynamics of foodservice management decisions for cost control with consideration given to availability, quality, and cost of raw ingredients, distribution systems, labor required, available equipment, and merchandisability.
Class 4, Credit 4

### ISMF-225  Principles of Food Production
**Registration #0621-225**
Introduction to the basic principles involved in the preparation of high quality food. Topics include composition, varieties, availability and function of foods and ingredients. Organization, management and techniques for efficient food production are stressed. Uniform and professional knife and pastry kits are required.
(ISMF-222)
Class 2, Lab 4, Credit 4

### ISMF-310  Commodity Market Analysis
**Registration #0621-310**
An overview of the commodity futures and options markets. Special emphasis is placed on the fundamental economic factors affecting agricultural and energy-based futures prices. The economic principles and policies supporting hedging and speculating strategies will be analyzed. Students will be introduced to technical price analysis, basis analysis, and the global economics of foodservice commodities.
Class 4, Credit 4

### ISMF-315  Foodservice Marketing
**Registration #0621-315**
This course provides students with a business-to-business perspective of the marketing of products to the foodservice industry. It also provides an understanding of distribution systems and foodservice marketing environments. Both macro and micro marketing environments and issues will be explored. The class will consider various marketing mix elements as they relate to segments of the foodservice industry. Case studies and readings will be utilized to give students realistic opportunities to analyze and develop practical solutions.
Class 4, Credit 4
ISMF-321  Menu Planning and Merchandising
Registration #0621-321
The menu is the main focus of the foodservice operation, and its relationship to efficient operation, merchandising, theme, and customer satisfaction will be considered. "Truth in menu" issues, layout, copywriting, standardized recipes, and pricing techniques will be explored. A wide variety of menus will be critiqued. The student will plan and produce a menu for a theme restaurant and will also create a cycle or other menu for a specific customer and situation. (ISMF-222)

Class 2, Credit 2

ISMF-330  Quantity Food Production
Registration #0621-330
Principles of quantity food production including equipment operation, holding techniques, use of standard recipes, conversion of small quantity recipes to large quantity, production techniques, forecasting, temperature control, cafeteria/buffet service, purchasing, and inventory systems. Additionally, various sanitation and safety topics will be explored. A survey of micro-organisms that cause food spoilage and poisoning, with an emphasis on causes of spoilage and their prevention, will be covered. (ISMF-222)

Class 4, Credit 4

ISMF-331  Restaurant Operations
Registration #0621-331
Entry-level production and service skills for line positions currently used in the hospitality industry. Laboratory assignments are in the operation and maintenance of Henry's, a full-service restaurant modeled after industrial, hotel, and restaurant operations. Students will be assigned to defined job descriptions in production and service on a rotating basis. (ISMF-330)

Class 3, Lab 10, Credit 6

ISMF-410  Food Processing/Quality Assurance
Registration #0621-410
An introduction to traditional and contemporary food processing methods with emphasis on applications to foodservice operations. The effect of these technologies on the storage life and sensory qualities of the products will be examined along with common modes of quality loss in foods. Students will be introduced to industry-standard quality assurance measures.

Class 4, Credit 4

ISMF-416  Product Development
Registration #0621-416
Food experimentation; sensory and objective evaluation of food quality; interaction of food ingredients; recipe development, writing, and presentation; problem solving; experimental design; written and oral communication of research. (ISMF-331)

Class 2, Lab 6, Credit 6

ISMF-424  Food and Labor Cost Control
Registration #0621-424
This course will deal with industry related problems and will combine classroom study of the fundamental principles of costs and controls, as applied by management, with on-location application of financial practices and specialized methods and techniques utilized in solving cost and management problems in the hotel/motel and food services industry.

Class 4, Credit 4

ISMF-499  Cooperative Education
Registration #0621-499
Career-related work experience. Employment within the food, hotel, travel industry monitored by the Center for Cooperative Education and Career Services and the School of Food, Hotel and Travel Management. Designed for the student to experience progressive training on the job as related to the academic option. Freshmen begin co-op in the summer following their first-year studies. Graduation requirement.

Class 0

ISMF-502  Decorative Techniques
Registration #0621-502
Students will be introduced to techniques of food decoration, with emphasis on elementary and advanced pastry bag work; design and color in the creation of special-occasion cakes; molding of gum paste, marzipan, and pulled sugar decorative items; and the art of molded and piped chocolate pieces. Students will design and create four projects representing these skills.

Lab 4, Credit 2

ISMF-505  Foodservice Market Segments and Analysis
Registration #0621-505
This course will provide students with a strategic and tactical foundation for effective marketing to the specific foodservice industry market segments. Students will also discover and develop sources of market information as related to specific segments. The various methods of obtaining market information and the analysis of research information will be explored.

Class 4, Credit 4

ISMF-511  Banquet and Catering
Registration #0621-511
Designed to give students management experience in planning, organizing, supervising, preparation and service of foods for specially booked functions. Students plan catered events for 80 people and invite the public to attend. Open to seniors only. (ISMF-331)

Class 1, Lab 12, Credit 4

ISMF-512  Design and Layout of Food Operations
Registration #0621-512
Evaluation of different foodservice facilities with regard to design and layout. Review of layouts in operating full-service facilities and suggestions for innovative ways to utilize the space to its fullest potential. (ISMF-331 or permission of instructor)

Class 2, Credit 2

ISMF-515  Foodservice Concept Development and Planning
Registration #0621-515
This course will provide students with the theoretical basis for developing and implementing sound foodservice plans and theme concepts. The course will give consideration to the variety of financial, economic, and demographic factors influencing concept planning. Special emphasis will be placed on developing food service business plans, budgets, site selection, and understanding the importance of these variables on the theme, atmosphere, style of service, menu prices, and labor costs of the operation.

Class 4, Credit 4
ISMF-520 Foodservice Computer Applications
Registration #0621-520
The student will be introduced to personal computer operating system commands and spreadsheet and data base software to explore effective computer-assisted management. Projects include applying or adapting existing templates and components of standard software to summarize and analyze data for effective management. Students will apply this to creation of an original program on spreadsheet and/or data base software.
Class 4, Credit 4

ISMF-521 Computerized Models for Decision Making
Registration #0621-521
Students will explore several special-use software packages in food service management, including those used for menu-engineering, labor management, marketing data, and standard recipe/costing/ordering/inventory functions. Software and data will be integrated and evaluated in various decision-making scenarios.
Class 4, Credit 4

ISMF-522 Contract Environment of the Foodservice Industry
Registration #0621-522
The course will provide students with the theoretical basis for identifying the legal environment of the foodservice industry. Special emphasis will be placed on identifying the rights and obligations of the foodservice operator in the contractual environment of foodservice operations.
Class 2, Credit 2

ISMF-525 Restaurant Management
Registration #0621-525
This course is designed to develop entry-level management competence through the operation of a full-service restaurant with beverage operations. Students will rotate through various management positions. They will be exposed to four major areas: planning, organization, leadership, and control. Use of the school’s computer lab in planning is an integral part of the course.
Class 2, Lab 10, Credit 6

ISMF-530 Specialized Commercial Operations
Registration #0621-530
Application of foodservice operating principles to specific commercial operations. Operations from single cart to multi-unit dining in various settings (such as sports arenas, convention centers, industry, health care, schools, hotels, and resorts) and with various constraints will be explored. Staffing, layout, traffic flow, equipment requirements, decor, and control will be covered.
Class 4, Credit 4

ISMF-531 Foodservice Commodity Assessment
Registration #0621-531
Technical and economic analysis of common foodservice commodities. Special emphasis is placed on examining product value relative to price, cost savings, service enhancement, nutritional value, and overall customer preference. Both fresh and processed commodities will be examined. Extensive exposure to industry representatives.
Class 4, Credit 4

ISMF-532 Foodservice Marketing and Distribution Seminar
Registration #0621-532
Presentation and discussion of current and relevant issues in food-service marketing and distribution. Discussion topics will compare and contrast domestic and international distribution and marketing systems and monetary, cultural, and political/legal issues.
Class 4, Credit 4

ISMF-545 Beverage Operations
Registration #0621-545
A study of the principles, methods, and practical applications of beverage management as it applies to the commercial beverage industry. Emphasis in the course is placed on administrative objectives, operational procedures, and internal control.
Class 2, Credit 2

Hotel and Resort Management

ISMH-200 Hotel Operations
Registration #0622-200
This course serves to introduce the student to the distinctive nature of hotel operations. This is accomplished by identifying the standard functions that interrelate to produce the whole hotel service. The hotel’s principle product, the guest room, will be given detailed study, as well as the various forms of business organization that comprise the accommodation sector of the hospitality industry.
Class 4, Credit 4

ISMH-205 Hospitality Industry Real Estate
Registration #0622-205
This course is designed to provide the student with insight into the development of hospitality real estate and the elements that contribute to decisions on construction, development, and expansion of properties. Attention will be given to site selection and development processes as they relate to the commercial hotel, resort, foodservice, and travel locations. Contributing elements of market conditions, financial feasibility, construction needs, and property sizing will be explored.
Class 4, Credit 4

ISMH-210 Hotel Marketing and Sales Management
Registration #0622-210
This course introduces the student to the application of the marketing concepts in hotel operations and the visitor industry. Included will be conventions and visitors’ bureaus, hotels and convention centers. This will be accomplished by defining the marketing function, situation analysis, marketing organization, sales office work flow, customer contact methods, and servicing procedures generally practiced in the hotel industry.
Class 4, Credit 4

ISMH-310 Resort Development and Management
Registration #0622-310
This course is designed to give the student an understanding of how resort and hotel properties are developed as tourist and business destinations. Focus will be on the planning, development, operation, design, special needs of recreational surfaces and financing of such properties. Students will, as part of this study, select a specific type of property and analyze the methods used to develop it.
Class 4, Credit 4
ISMH-315 Hotel Engineering and Maintenance
Registration #0622-315
This course provides the student with information on the maintenance and engineering discipline in hotel and resort facilities. Management and administrative practices, life safety concepts, energy monitoring, computer applications, and budgeting in the realm of hotel maintenance are studied.
Class 4, Credit 4

ISMH-355 Financial Management for the Hospitality Industry
Registration #0622-355
This course presents FHTM students with accounting and finance concepts that are essential in hospitality management. Hotel accounting principles, income statement analysis, industry-accepted ratio analysis, operational forecasting of budgeting, and capital budgeting strategies are examined.
Class 4, Credit 4

ISMH-470 Leadership and Executive Development
Registration #0622-470
This course presents a “hands-on” look at the leader/manager. It will provide FHTM students with a variety of leadership and management principles, applications and exercises specifically designed for the hospitality industry. These new skills will enable them to progress more effectively in the hospitality industry and to begin to establish their own personal leadership and management style. The course makes extensive use of lectures, laboratories and industry expertise.
Class 4, Credit 4

ISMH-480 Personnel and Training for Hospitality Industries
Registration #0622-480
This course presents FHTM students with a complete repertoire of human resource management (HRM) issues. It addresses all the current HRM topics and is designed to enhance the student's ability to deal effectively with current HRM topics. The laboratories attempt to develop conceptual thinking abilities. The course also focuses on HRM training techniques—an area of specific concern in the hospitality industry. By emphasizing various training techniques and practices, highly skilled graduates can immediately employ one of the hospitality industry's most valuable tools-training to aid in the retention and management of human resources. The course makes extensive use of lectures and laboratory exercises.
Class 4, Credit 4

ISMH-510 Convention Management
Registration #0622-510
This course provides the student with an opportunity to explore the function of conventions from the point of view of the convention center manager. Consideration will be given to various methods used to sell a location to a planner and the servicing of large groups. Also included will be the identification of vocabulary and the role of the meeting planner as a force in the marketing of conventions. Trade shows, floor layouts and local codes affecting conventions will also be reviewed.
Class 4, Credit 4

ISMH-540 Risk Management for the Hotel Industry
Registration #0622-540
An examination of the environment in which the hospitality manager functions. Focus is on the management of risk as part of operations. The implications of tort and contract law specifically relating to the industry will be undertaken, and an explanation of how persons may avoid exposure to risk will be made. This will include forms of insurance, hold-harmless clauses, and management decisions on the importance of coverage given different degrees of risk.
Class 4, Credit 4

ISMH-560 Tourism Concepts
Registration #0622-560
This course emphasizes tourism as a system and develops its interrelated and interdependent elements. Major economic, environmental, and socio-cultural concepts are discussed, including interactions between visitors and host communities. The role of private and public sector tourism organizations is introduced by examining tourism destinations throughout the world.
Class 4, Credit 4

ISMH-570 Tourism Planning and Development
Registration #0622-570
This course examines the processes involved in planning and developing a tourist's destination, including the required infrastructure. A major focus will be on benefits and impacts associated with tourism development, as well as the strategies for maximizing benefits and minimizing adverse effects.
Class 4, Credit 4

ISMH-580 Destination Marketing
Registration #0622-580
This course focuses on the processes and techniques used to promote tourism destinations such as resorts, attractions, and individual communities. Emphasis will be placed on the role that destination marketing organizations such as convention centers, visitors' bureaus and tourism promotion agencies play in marketing a destination. The development of tourism marketing plans and management of inquiry-fulfillment-referral processes will be discussed.
Class 4, Credit 4

Travel Management

ISMT-206 Travel Distribution Systems
Registration #0623-206
A functional approach is used to describe the market distribution channel for travel products/services. The role of retail travel agents, wholesale tour operators, and specialty channelers such as meeting planners is discussed. Various economic models are examined in order to analyze the pricing structure associated with the travel suppliers' ability to provide travel services.
Class 4, Credit 4

ISMT-210 Introduction to A. A. SABRE Reservations
Registration #0623-210
This course emphasizes acquiring operational proficiency with American Airlines' SABRE reservation system. Using SABRE's live and training modes, the course topics addressed include: creating passenger name records (PNRs), itinerary pricing, fare quotes, queues, and flight information. This course is equally divided between lecture and Travel Lab simulations.
Class 4, Credit 4
ISMT-312  Travel Reservation Procedures
Registration #0623-312
Reservation procedures and documentation sourcing for each of the various modes of passenger transportation are examined. Particular attention is given to hotel reservation guide books, cruise ship deck plans and reservation procedures, and interpreting travel brochures. Emphasis is on the various forms used in travel documentation.
Class 2, Credit 2

ISMT-314  Salesmanship Techniques for Travel
Registration #0623-314
The role of personal selling as persuasive communication and part of the partnering relationship is examined. Course topics include: qualifying clients, identifying buying motives, making the presentation, handling objections, closing the sale, and sale follow-up. Role-play scenarios are used to reinforce selling concepts.
Class 2, Credit 2

ISMT-410  Meeting Management
Registration #0623-410
A course to introduce the student to the field of meeting management. We take the point of view of a corporate or independent meeting planner in examining the various phases of meeting planning. Students also examine the formulation of goals and how meetings may be evaluated from both a return on investment perspective and the satisfaction of the attendees. Computer programs will be investigated and tested, and a variety of budget strategies will be examined.
Class 4, Credit 4

ISMT-413  Corporate Travel Marketing
Registration #0623-413
This course focuses on the processes and techniques used to promote tourism attractions and communities to the corporate buyer. Emphasis will be on the role that organizations such as tourist promotion agencies, airlines, hotel corporations, car rental agencies, and destination management companies play in marketing the convention-usable attributes of a location. How these organizations can be used by the corporate meeting planning and travel manager to compare sites will be discussed.
Class 4, Credit 4

ISMT-420  Corporate Travel Planning
Registration #0623-420
This course focuses on the specific travel goals, accounting policies, and informational requirements of corporate (commercial-business) travel. Three major orientations of corporate travel are examined: corporate travel operated through the firm's travel coordinator; corporate travel provided by the retail travel agency; and incentive travel. Major topics include: corporate travel policy and procedures, exhibition marketing, requests for proposal (RFP), house organs and newsletters, and the sales blitz.
Class 4, Credit 4

ISMT-520  Exhibit Marketing
Registration #0623-520
This course emphasizes the examination of the budgeting process associated with developing and marketing corporate exhibits. A major focus of the course is the evaluation of exhibits based on cost-to-revenue ratios.
Class 2, Credit 2

ISMT-522  Negotiations and Conflict Management
Registration #0623-522
This course examines the negotiation process within the hospitality/tourism industry by exploring the nature and sources of interpersonal conflict and its dynamics. Collaborative versus competitive approaches to managing conflict are discussed. Role-play situations are used to differentiate and reinforce negotiation strategies.
Class 2, Credit 2

ISMT-524  Risk Management in Travel/Tourism
Registration #0623-524
This course examines the risk management process as it applies to the travel/tourism industry. Topics include insurance mechanisms; property and time element risks; criminal insurance risks (burglary, hiring, safes, credit risks); casualty risk (general liability, business risk); workers' compensation; personal, personnel, and travel insurance.
Class 2, Credit 2

ISMT-526  Travel/Tourism Policy & Law
Registration #0623-526
An examination of the various laws associated with travel and tourism and their resultant policy implications. Four major areas are examined: domestic and international air transportation; car rental, cruise and rail; hotels and resorts; and retail travel agents and wholesale tour operators.
Class 4, Credit 4

ISMT-530  Intermediate SABRE Applications
Registration #0623-530
This course enables students to progress to the "total automation" level associated with SABRE. The focus of the course is to provide an overall picture of how the SABRE system provides accurate invoicing and readable itineraries. Topics include: Phase IV ticketing, queues, currency conversions, segments, and accounting data entry. Most of the course work is done in SABRE's live mode.
Class 4, Credit 4

ISMT-535  SABRE Non-Air Applications
Registration #0623-535
This course uses SABRE's direct reference system (DRS) as a basis for information concerning non-airline-oriented information. The course is designed to accommodate non-travel and tourism majors. Topics include: car sales options, hotel index descriptions, hotel availability, tour index, immigrations and customs guide, and FAACTS reports.
Class 4, Credit 4

ISMT-550  Seminar in Travel/Tourism Management
Registration #0623-550
This course surveys various issues and events that influence the travel and tourism industry. Emphasis is also on how these factors will affect the careers of future professionals. This course is intended for students who have completed all of their required cooperative education experience.
Class 4, Credit 4
**Department of Military and Aerospace Science Reserve Officers Training Corps (ROTC)**

**ARMY**

**First Year**

**MMSM-201 Introduction to Military Science**
Registration #0640-201
This course is designed to introduce the student to the ROTC program and military map reading techniques. Topics of primary interest will include: the organization and purpose of ROTC program, the organization of the U.S. Army, the National Guard, the Army Reserve, career branches and the role of a lieutenant; leadership laboratory.
Class 1, Lab 1, Credit 2

**MMSM-202 Applied Military Dynamics**
Registration #0640-202
This course is designed to give the student an introduction to some military dynamics. Topics of primary interest are military writing style, experiential small group leadership opportunity, weapons and marksmanship training and an introduction to evaluating and applying first aid.
Class 1, Lab 1, Credit 2

**MMSM-203 Military Heritage**
Registration #0640-203
This course is designed to provide a practical introduction to the basic military organization and rank structure; the historical basis for customs and traditions found in the military, and current discussions on the military and its impact upon society; leadership laboratory.
Class 1, Lab 1, Credit 2

**Second Year**

**MMSM-301 Military Geography**
Registration #0640-301
A study of military land navigation with special emphasis given to navigation using a map and compass. Geographic concepts and realities are studied as they apply to the solution of military problems. Major topics for discussion will include identification of terrain features, use of grid coordinates, polar coordinates, military correspondence, and First Aid tasks. This course stresses practical application rather than theory; leadership lab.
Class 1, Lab 1, Credit 2

**MMSM-302 Psychology and Leadership**
Registration #0640-302
This course provides the student the basic principles of leadership and management of human resources; motivation, morale and communication. Special emphasis is planned on applying the theories and models of the behavioral sciences and personnel management to leadership as it functions in a military environment; leadership laboratory.
Class 1, Lab 1, Credit 2

**MMSM-303 The Military and American Society**
Registration #0640-303
This course is designed to give the student an introduction to the principles of war and the study of the application of these principles in recent military history. Emphasis will be placed on the Army’s role today as peacekeeper and NATO partner. Other topics will include Soviet Union military systems command and staff functions and the officer personnel management system. Leadership laboratory.
Class 1, Lab 1, Credit 2

**Third Year**

**MMSM-401 Military Tactics**
Registration #0640-401
This course stresses practical exercises on basic map reading skills and provides a working knowledge of fundamentals and principles of combat operation as planned for and executed at light infantry squad and platoon level; leadership laboratory.
Class 2, Lab 1, Credit 3

**MMSM-402 Military Communications**
Registration #0640-402
This course provides knowledge and training of basic military skills essential as a junior officer; an introduction to military communication equipment and techniques; the leadership communication process. Leadership laboratory.
Class 2, Lab 1, Credit 3

**MMSM-403 Military Operations**
Registration #0640-403
A continuation of military skills training with emphasis on military intelligence/security, operations at the small unit level; staff functions and leadership laboratory; field training exercise.
Class 2, Lab 1, Credit 3

**Fourth Year**

**MMSM-501 Combined Arms Operations**
Registration #0640-501
The course introduces the student to the mission, organization, and capabilities of the branches of the Army. Discussions on the tactics of the air/land battle, advanced studies in U.S. and Soviet capabilities and tactics, U.S. NBC defense and U.S. Army intelligence and electronic warfare system; leadership laboratory.
Class 2, Lab 1, Credit 3

**MMSM-502 Military Administration and Logistic Management**
Registration #0640-502
This course includes discussions and seminars on the Army training management system, military justice, supply and property accountability, maintenance management, officer-enlisted personnel management; leadership laboratory.
Class 2, Lab 1, Credit 3

**MMSM-503 Military Ethos**
Registration #0640-503
This course examines the ideas and issues that define the role of the military in our larger society. Emphasis is placed on the professional and ethical standards required of the military officer. Other topics include: planning and conducting meetings, teaching and counseling, active duty orientation, preparations for commissioning; leadership laboratory; field training exercise.
Class 2, Lab 1, Credit 3
MMSM-510 Senior Seminar and Project  
Registration #0640-510  
For military science students who have completed their junior year of military study. The seminar is directly related to military science projects that students are working on and consists of written and/or oral presentations given during the quarter. Students may also be required to present this material to other students in a classroom environment.

Class 2, Credit 2

AIR FORCE

IMAF-201,202,203 Leadership Lab I  
Registration #0650-201, 202,203  
Leadership Laboratory I focuses on benefits, opportunities, privileges and responsibilities associated with an Air Force commission. AF customs and courtesies, AF environment, drill, and ceremonies are also covered. Demonstrates flight movement procedures. Responsibility of base units to mission accomplishment.

Credit 1

IMAF-210,211,212 The Air Force Today I, II, III  
Registration #0650-210,211,212  
Course series on the basic characteristics of air doctrine; U.S. Air Force mission and organization; functions of U.S. strategic offensive, general purpose, and aerospace support forces; officership; and assessment of written communicative skills.

Credit 1

IMAF-301,302,303 Leadership Lab II  
Registration #0650-301,302,303  
Demonstrates commanding effectively in individual drill positions and flight formations, effective execution of cadet officer functions within parade ceremonies and squadron drill movements. Application of personal leadership to both military and civilian activities and comprehension of field training are covered.

Credit 1

IMAF-401,402,403, 404,405,406,501,502, 503 Leadership Lab III, IV, V  
Registration #0650-401,402,403, 404,405,406, 501,502, 503  
Advanced leadership experiences in officer activities give students opportunity to apply principles learned in labs and courses. Orientation for active duty.

Credit 1

Note: Other AFROTC courses can be found under the College of Liberal Arts and College of Business.
### College of Business

#### Accounting

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Registration #</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BBUA-302</td>
<td>Managerial Accounting</td>
<td>#0101-302</td>
<td>4</td>
<td>The accounting function as a source of data for managerial decision making. Control of the operations of the firm is emphasized through the use of reports for internal and external consumption. Major emphasis is on the analysis of accounting data rather than on its collection. (BBUA-301)</td>
</tr>
<tr>
<td>BBUA-319</td>
<td>Legal Environment of Business</td>
<td>#0101-319</td>
<td>4</td>
<td>An introduction to legal principles and their relationships to business organizations. This includes a review of the laws that govern their operations. This course will explore the background and origin of the U.S. legal system, its law enforcement agencies, and the legal procedures used by the government to enforce its laws. Representative topics will include environmental law, bankruptcies, regulatory law, consumer protection, labor relations. A substantial portion of the course will deal with contract law.</td>
</tr>
<tr>
<td>BBUA-320</td>
<td>Business Law</td>
<td>#0101-320</td>
<td>4</td>
<td>This course explores in greater depth the implications of the Uniform Commercial Code to business operations. Representative topics covered include: sales, commercial paper, corporations, partnership, agency. Topical cases and examples are used to help the student grasp the business implications of the law and its nomenclature. (BBUA-319)</td>
</tr>
<tr>
<td>BBUA-408,409</td>
<td>Intermediate Accounting I, II</td>
<td>#0101-408,409</td>
<td>4</td>
<td>A detailed study of the concepts, theories and practices used to prepare comprehensive financial statements in accordance with generally accepted accounting principles. The course will explore alternative accounting methods and valuation bases and the impact these have on financial statements. Current pronouncements of the Financial Accounting Standards Board will be studied if they are appropriate to the subjects of the course outline. (BBUA-302, junior status)</td>
</tr>
<tr>
<td>BBUA-431</td>
<td>Cost Accounting</td>
<td>#0101-431</td>
<td>4</td>
<td>This course emphasizes the uses of cost data and cost reports for managerial decisions. Included are problems and procedures relating to job-order, process, standard cost systems, the techniques of overhead distribution, and various cost allocation techniques. The role of the controller's organization in the furnishing of accounting data and reports for managerial planning and control is emphasized. (BBUA-302, junior status)</td>
</tr>
<tr>
<td>BBUA-522</td>
<td>Tax Accounting I</td>
<td>#0101-522</td>
<td>4</td>
<td>A basic course in federal income taxation, emphasizing individuals. Tax aspects of transactions common to all taxpayers are covered, such as concepts of income, deductions, credits, and taxation of property transactions. (BBUA-302, junior status)</td>
</tr>
<tr>
<td>BBUA-523</td>
<td>Tax Accounting II</td>
<td>#0101-523</td>
<td>4</td>
<td>A continuation of Tax Accounting I, emphasizing taxation of corporations and partnerships. Includes tax aspects of acquisitions and mergers, as well as international taxation. (BBUA-522, junior status)</td>
</tr>
<tr>
<td>BBUA-530</td>
<td>Auditing</td>
<td>#0101-530</td>
<td>4</td>
<td>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. (BBUA-409, junior status)</td>
</tr>
<tr>
<td>BBUA-540</td>
<td>Advanced Accounting</td>
<td>#0101-540</td>
<td>4</td>
<td>The application of modern accounting theory to problems of advanced complexity. Topical coverage includes consolidated financial statements, partnerships, government and not-for-profit entities and foreign currency implications. (BBUA-409, junior status)</td>
</tr>
<tr>
<td>BBUA-550</td>
<td>Accounting Theory</td>
<td>#0101-550</td>
<td>4</td>
<td>A comprehensive study of the official pronouncements of the Accounting Principles Board and the Financial Accounting Standards Board. The course will examine alternative theories of accounting. (BBUA-409, senior status)</td>
</tr>
</tbody>
</table>

#### Management

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>BBUB-011</td>
<td>Freshman Seminar</td>
<td>#0102-011</td>
<td>0</td>
<td>This course serves as an introduction to college life for College of Business freshmen. Students meet weekly in small groups with a facilitator. Individual sessions focus on getting to know RIT and the College of Business, self-discovery, establishing effective relationships, coping with stress, and other topics important to the group. The seminar is experiential by design and relies on the active participation of each student. Required of all freshmen in the College of Business.</td>
</tr>
</tbody>
</table>
BBUB-230, 231, 232  Business Concepts and Directions I, II, III
Registration #0102-230, 231, 232
This three-course sequence prepares the first-year student for the study of business. Emphasis is placed on the philosophy of management known as Total Quality Management. In addition, the courses will help the student make decisions about a career and a major in a specific field of study within business. Upon completion of this sequence it is expected that the student will enter second-year studies with a greater understanding and appreciation of business and better communication and interpersonal skills.
Credit 2

BBUB-310, 311  Air Force Management and Leadership I, II
Registration #0102-310, 311
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. (ROTC)
Credit 5 each
NOTE: Other Air Force ROTC course listings can be found under the College of Applied Science and Technology.

BBUB-405  Introduction to Work Organizations
Registration #0102-405
This course will introduce students to the concept of work organizations and how they function. Students will learn of the different industries in which work organizations fall and how to become and help others become effective members of organization through motivation, leadership, interpersonal conflict management, and stress handling. Additionally, the student will learn about the diverse workforce, social issues, and government regulation of work.
Credit 4 (This is a telecourse) (Not expected to be offered in the coming year)

BBUB-410  Small Business Management for Non-Business Majors
Registration #0102-410
An exploration of the basics of small business management with an emphasis on understanding the role of the small business owner. Major topics include: starting and operating a small business, small business marketing, financial and administrative controls, and governmental interactions with small business. (Junior status or equivalent)
Credit 4

BBUB-430  Organizational Behavior
Registration #0102-430
Human behavior in organizations. Course emphasis: individual and interpersonal skills; group and intergroup processes; and management of organizational performance and change. Topics include: leadership; communication; motivation; perception and conflict management. (Junior status)
Credit 4

BBUB-432  Comparative Management
Registration #0102-432
An analysis of business behavior and organization in western Europe, the U.S., and the Pacific Basin. Particular emphasis is placed on the differential effect of cultures on management and performance. Variations in leadership styles, risk tolerance and motivation in different cultures will be reviewed. (BBUB-430, junior status)
Credit 4

BBUB-438  Business Ethics
Registration #0102-438
This course examines major western society ethical theories and moral traditions and their business applications. Students have an opportunity to bring theories and traditions to bear on specific issues. These issues will be related to case studies: equal opportunity and affirmative action, product liability, introduction of new technologies (such as bioengineering), and also to business practices in other cultures. (BBUB-430, junior status)
Credit 4

BBUB-440  Survey of International Business
Registration #0102-440
This course is a survey of international business issues and strategies. Its objective is to examine the world in which international business occurs. Subject areas covered include general background of international business; economic, political, and human environments; world financial environment and functional operations of the firm; future of international business. (Junior status)
Credit 4

BBUB-455  Human Resources Management
Registration #0102-455
An overview of the personnel and human resource function in both large and small organizations. The major topics studied include management of effective performance in relationship to employee selection, training and development, compensation, safety and health, performance evaluation, compensation systems, equal employment, and cultural diversity. Some emphasis is placed on the legal aspects of managing human resources. (BBUB-430, junior status)
Credit 4

BBUB-460  Management and Leadership
Registration #0102-460
The role of managerial leadership in guiding employee contributions to the attainment of organizational goals. Leadership, supervision and delegation as techniques for motivating employee performance. The importance of interpersonal skills for effective managerial leadership. (BBUB-430, junior status)
Credit 4

BBUB-462  Management Development
Registration #0102-462
Training and management development practices in work organizations. Both management and individual approaches to skills development and utilization over the career cycle will be considered. (BBUB-430, junior status)
Credit 4
BBUB-490  
Entrepreneurship  
Registration #0102-490  
The focus of this course is the creation and growth of new ventures. Major topics include: evaluating business opportunities, franchising, the role of small business and entrepreneurship in the economy, problems associated with family firms, sources of financing, and the psychology of the entrepreneur. An integral part of the course will be the development, writing, and presentation of a business plan. (BBUB-430, BBUF-441, BBUM-463, and junior status)  
Credit 4

BBUB-507  
Business Environment  
Registration #0102-507  
The impact and effect of social responsibility and law on business activity including the managerial response to those environmental forces. Topics include a study of the demands made on the firm by consumers, citizens groups, the government, and educational institutions. Ethics in business are treated extensively. The implications of current events are an integral part of this course. (Senior status)  
Credit 4

BBUB-520  
Seminar in Total Quality Management  
Registration #0102-520  
This seminar brings together elements of TQM from operations management, marketing, and human resources management and training. Emphasis is on customer satisfaction, quality improvement, problem solving, team building, and benchmarking. (Senior status)  
Credit 4 (This course may be used as a management, marketing, or business elective)

BBUB-536  
Organizational Design and Performance  
Registration #0102-536  
Applications of organizational design and theory to organizational performance. Traditional and emerging concepts that affect work organization performance. Characteristics of high performance organizations. Interaction of organization and environment. May include a strengths/weaknesses analysis of an existing organization. (BBUB-430, junior status)  
Credit 4

BBUB-547  
Entrepreneurial Field Studies  
Registration #0102-547  
Students enrolled in this course are provided the opportunity to serve as consultants to a specific small business firm within this geographic area. Under an arrangement with the Small Business Administration, and working under the supervision of a senior faculty member, teams of students provide management consulting about a variety of problems to small businesses. As a practicum this course does not have regularly scheduled class hours. Instead students confer with their faculty member on an as-needed basis. (BBUB-490, senior status)  
Credit 4

BBUB-551  
Strategy and Policy  
Registration #0102-551  
An integrated view of business operations, both national and international. This course is designed to provide experience in combining theory and practice gained in other experiences, and in studying state-of-the-art principles of policy, planning and implementation. Cases are used extensively as major vehicles for understanding the applications of strategic management principles and techniques for company operations. (BBUB-430, BBUF-441, BBUM-463, BBUQ-401, senior status)  
Credit 4

BBUB-554  
Management Seminar  
Registration #0102-554  
A variety of special interest topics in the field of management, ordinarily treated in more depth than would be possible in a survey course. The topic and instructor for each seminar will be announced in advance, along with any prerequisites or other special requirements. Seminar topics in recent years have included stress management, microcomputers in human resources management, compensation and appraisal, and human resources planning. (Junior status)  
Credit 4

Economics

BBUE-405  
Intermediate Microeconomics  
Registration #0103-405  
A course in economic theory at an intermediate level dealing with the contemporary analysis of price and distribution under conditions of free competition and various degrees of monopoly control. Business applications are given along with the exposition of the theory itself. (GSSE-301, 302, junior status)  
Credit 4

BBUE-406  
Intermediate Macroeconomics  
Registration #0103-406  
The course is concerned with the overall performance of the economy. It deals with the aggregate analysis of saving and investment, the level of income, the level of employment, and the level of prices. Governmental monetary and fiscal policies will also be evaluated. (GSSE-301, 302, junior status)  
Credit 4

BBUE-407  
Managerial Economics  
Registration #0103-407  
Analysis of the firm. Problems facing management: economizing in the use of resources, optimal combinations of products, pricing, competitive forces in markets affecting the firm. (BBUE-405, junior status)  
Credit 4 (not expected to be offered in the coming year)

BBUE-408  
Business Cycles and Forecasting  
Registration #0103-408  
Analysis of economic conditions affecting the firm. Theory of business fluctuations. Forecasting techniques and services available to the firm. (BBUE-405 or BBUE-406, junior status)  
Credit 4 (not expected to be offered in the coming year)

BBUE-554  
Seminar in Economics  
Registration #0103-554  
Investigation of advanced problems and policies in economics. Emphasis is on student reports and papers. (Junior status, permission of instructor)  
Credit 4 (not expected to be offered in the coming year)

Finance

BBUF-441  
Corporate Finance  
Registration #0104-441  
This is the basic course in financial management. It covers the concepts of security markets, risk analysis, time value of money, asset valuation (as it applies to capital budgeting, working capital management, and long-term financing), and cost of capital. Analytic techniques and computer applications are introduced and used. (BUQ-330, BBUA-302, GSSE-301, junior status)  
Credit 4
BBUF-445 Advanced Corporate Finance
Registration #0104-445
An extended coverage of business finance with increased emphasis on analytical and computer applications in resource allocation and asset management. Course topics include financial securities, security markets, capital structure, financial statement analysis, cost of capital, leverage, dividend policy, and capital budgeting. (BBUF-441, junior status)
Credit 4

BBUF-504 International Finance
Registration #0104-504
This course is concerned with the monetary aspects of international economic relations. It deals with the following topics: the balance of payments, foreign exchange rates and markets, gold standard, flexible exchange rates system, international capital movements, exchange, restrictions, and international monetary experience. (BBUF-441, junior status)
Credit 4

BBUF-507 Security Analysis
Registration #0104-507
The course focuses on the considerations involved when investing in financial assets. From the perspective of an investment manager, the student analyzes the investment environment, defines objectives, assesses risk, performs fundamental and technical analysis, and evaluates security performance. (BBUF-441, junior status)
Credit 4

BBUF-508 Portfolio Management
Registration #0104-508
This course extends Security Analysis to issues concerning portfolio selection. From the perspective of a portfolio manager, the student focuses on modern portfolio theory with respect to the efficient market hypothesis, timing, asset allocation, diversification, and evaluation of security portfolios. (BBUF-507, junior status)
Credit 4 (Not expected to be offered in the coming year)

BBUF-510 Financial Institutions and Markets
Registration #0104-510
Analysis of the different kinds of financial institutions such as commercial banks, savings institutions, insurance companies, pension funds, and others. Primary emphasis on interest rate risk exposure. Also covers loan analysis and various financial policy issues. (BBUF-441, junior status)
Credit 4

BBUF-525 Theory of Finance
Registration #0104-525
This course is a sophisticated approach to the theory underlying modern business finance. Current developments in financial decision-making under risk and uncertainty are examined and the statistical foundations of modern finance theory are studied in detail. (BBUF-445, junior status)
Credit 4

BBUF-554 Seminar in Finance
Registration #0104-554
Course will be designed by individual instructor. (Varies by seminar content) (Permission of instructor, junior status)
Credit 4 (Not expected to be offered in the coming year)

Marketing

BBUM-463 Principles of Marketing
Registration #0105-463
A basic course in which the student is introduced to the marketing system and specific marketing functions of the business firm. An analytical approach is used to develop an understanding of marketing strategy. (Junior status)
Credit 4

BBUM-482 Marketing through Retailers
Registration #0105-482
An examination of the changing nature of the retail industry and its role in the American distribution system. The relationship between producers and retailers will be examined, along with the tools and techniques used by retailers to create a competitive advantage. (BBUM-463, junior status)
Credit 4

BBUM-505 Buyer Behavior
Registration #0105-505
A course focusing on the role of the ultimate consumer in the marketing process. Emphasis will be on understanding the psychological, cultural, and socioeconomic influences in the consumer decision-making process. (BBUM-463, junior status)
Credit 4

BBUM-550 Marketing Management Problems
Registration #0105-550
A course designed to provide the student with an in-depth knowledge of middle and upper management level marketing problems. In addition, the student should become familiar with tools used by marketing managers at these levels. (BBUM-505, 551, senior status)
Credit 4

BBUM-551 Marketing Research
Registration #0105-551
A study of research methods and procedures used in the marketing process. Topics include problem formulation, sources of market data, research methodology, data collection, data analysis, and the role of marketing research within the firm. (BBUM-463, BUQ-330, junior status)
Credit 4

BBUM-553 Sales Management
Registration #0105-553
The course emphasizes the sales function of marketing management. It centers around the problems managers face in the direction, control, and supervision of sales activities. (BBUM-463, junior status)
Credit 4

BBUM-554 Seminar in Marketing
Registration #0105-554
The objective of this course is to enable the student to bring together interests, learnings and experiences obtained in previous marketing courses. Specific course content will vary. (BBUM-463, junior status)
Credit 4
BBUM-555 International Marketing
Registration #0105-555
Management problems of marketing in foreign countries. Topics to be considered include the economic, cultural, and political roots of marketing systems. (BBUM-463, junior status)
Credit 4

BBUM-560 Marketing Communications
Registration #0105-560
This course is an overview of total promotion techniques and research. The course will stress promotion in terms of accomplishing overall marketing objectives, impact on the consumer, and the evaluation of promotion effectiveness. (BBUM-463, junior status)
Credit 4

BBUM-570 Industrial Marketing
Registration #0105-570
The course is concerned with developing understanding and application of marketing processes to industrial marketing organizations. Topics covered include: industrial purchasing motivations, industrial purchasing organizations, and industrial channels. (BBUM-463, junior status)
Credit 4

Decision Sciences
BBUQ-330 Introduction to Data Analysis
Registration #0106-330
An introduction to the use of data analysis and applied statistics in decision making. Topics include descriptive statistics (graphics, two variable regression and correlation) and a brief overview of probability theory, probability distributions, sampling theory and sampling distributions, the central limit theorem and confidence intervals. Extensive use of MINITAB. (SMAM-226, ICSA-200)
Credit 4

BBUQ-332 Applied Data Analysis
Registration #0106-332
A second course in data analysis and statistics emphasizing inference. Topics to be covered include: hypothesis testing; non-parametric statistics; multiple regression analysis; ANOVA and experimental design. Extensive use of MINITAB. (BBUQ-330)
Credit 4

BBUQ-334 Management Science
Registration #0106-334
A survey of quantitative approaches to decision making. Topics include formulation and solution of linear programming models, decision analysis, and simulation. Extensive use of computer software. (BBUQ-330)
Credit 4

BBUQ-353 Business Forecasting
Registration #0106-353
An introduction to forecasting methods in business, with an emphasis on data-based, statistical techniques. Extensive use of MINITAB. (BBUQ-330)
Credit 4

BBUQ-363 Systems Analysis and Design I
Registration #0106-363
The system development process, with emphasis on the analysis of information and logical design of a system. Topics include: systems development life-cycle, the role of the systems analyst, systems analysis tools and techniques, system performance analysis and feasibility analysis. (ICSA-303)
Credit 4

BBUQ-401 Operations Management
Registration #0106-401
A survey of production/operations management. Topics include quality control and improvement, project management, forecasting, production planning, scheduling, material requirements and capacity planning, inventory management, just-in-time/total quality management (JIT/TQM), international operations and strategic considerations. (BBUQ-334, junior status)
Credit 4

BBUQ-406 Quality Control and Improvement
Registration #0106-406
Study of total quality management (TQM) (including Deming's philosophy), objectives of quality planning, control and improvement, problem-solving methods and tools, the use of statistical methods for quality control and improvement, vendor relations, reliability concepts, and recent developments in quality; for example, quality function deployment (QFD) and Taguchi methods. The course focus is on the management and continuous improvement of quality and productivity in manufacturing and service organizations. (BBUQ-330, or equivalent, and junior status)
Credit 4

BBUQ-408,409 Materials & Operations Planning & Control I, II
Registration #0106-408,409
Study of the planning and control aspects of materials and operations for the product-process life cycle of a selected "thread" product. Production settings include: project/one-time build; job/lot build; and repetitive/continuous manufacturing. Planning topics include: product/process design and start-up, defect/problem prevention, forecasting and scheduling, materials and capacity planning, operations organization and planning/control systems. Execution and control topics include executing the schedule, just-in-time applications, cost management (direct, indirect), throughput and lead time management, work-in process inventory management, waste management, material management, interactions with the rest of the firm (e.g., ethics, policies, procedures, responsibilities, and contributions), measurement and reporting, including the use of corrective feedback loops. (BBUQ-401, or equivalent, and junior status; 408 is prerequisite for 409)
Credit 4 each

BBUQ-412 Inventory Management & Material Control
Registration #0106-412
Study of inventory management emphasizing the independent demand environment including distribution. Definition and functions of inventory; concepts, principles, techniques and systems necessary to select, order or ship, store, account for, and value inventory; inventory performance measures. (BBUQ-401 or equivalent, junior status)
Credit 4
BBUQ-415 Purchasing Management
Registration #0106-415
Study of the activities, responsibilities, relationships and systems involved in the purchase of materials, services and capital equipment. Topics include: identifying requirements; evaluating and selecting "best value" vendors; techniques for planning and executing the purchasing function, including fundamentals of negotiation; ethical and legal aspects of purchasing; interactions with the engineering, quality, manufacturing, materials management, transportation and legal functions and with suppliers; and international aspects of purchasing. Purchasing’s responsibility for quality, delivery, inventory, price and contribution to profit are also covered. (Junior status)
Credit 4

BBUQ-444 Manufacturing Strategy and Tactics
Registration #0106-444
This course integrates the skills learned in operations management with the fundamental disciplines of accounting, financial and marketing management. Key focuses in the course are manufacturing strategy, the creation and maintenance of a culture for continuous improvement, and the management of change. Manufacturing is investigated in a global context, including the risks and opportunities involved, the successes and failures of foreign and domestic firms and the strategies and tactics employed by them. The viability of an economy without a manufacturing base is questioned. Teams develop, execute, and report on a manufacturing strategy audit. (BBUQ-401 or equivalent, junior status)
Credit 4

BBUQ-464 Systems Analysis and Design II
Registration #0106-464
A continuation of the system development process, with focus on advanced design issues and an automated systems design tool. (BBUQ-363, junior status)
Credit 4

BBUQ-505 Information Systems
Registration #0106-505
The role of information systems in business organizations is discussed. Basic systems concepts and the software components of computer-based information systems are introduced. Hands-on use of personal computer technology is an integral and substantial part of the course. (ICSA-200, BBUA-302, BBUB-430, senior status)
Credit 4

BBUQ-540 Microcomputer Hardware and Applications
Registration #0106-540
A survey of current microcomputer hardware and software being used in business. Topics include personal computers, the internal functions of PC's and peripheral equipment, DOS, and applications software including the use of spreadsheet, database, and graphics programs. (ICSA-483, junior status)
Credit 4

BBUQ-553 Information Systems Management
Registration #0106-553
Examines the value of information in an organization and the management of the information technology (IT) area. Covers the strategic use of IT for competitive advantage, the introduction of new technologies within the organization, and the role of the IT manager in both managing IT operations and developing relationships within the organization. (ICSA-483, BBUQ-464, senior status)
Credit 4
College of Continuing Education

Business and the Arts

Accounting

CBCA-201 Financial Accounting
Registration #0201-201
Emphasis is placed on analyzing and recording business transactions, and understanding the results of these transactions. Preparations of basic financial statements required by any business are included.
Credit 4

CBCA-203 Managerial Accounting
Registration #0201-203
The functions and uses of accounting information are presented. Emphasis is placed on the preparation and operation of dynamic budget and the use of accounting data for control and profit planning. (CBCA-201)
Credit 4

CBCA-308,309 Intermediate Accounting I & II
Registration #0201-308, 309
Designed to broaden understanding of accounting practices and improve skills in gathering, analyzing, reporting, and evaluating accounting theory and concepts as they relate to business problems. (CBCA-203)
Credit 4/Qtr.

Business Law

CBCB-301 Business Law I
Registration #0202-301
Introductory course in business law including basic legal principles and procedures, criminal law, torts, contracts, sales and real property.
Credit 4

CBCB-302 Business Law II
Registration #0202-302
Continuation of CBCB-301 includes law agency, partnerships, corporations, insurance and bankruptcy. Also presents survey of commercial paper, secured transactions, and bank deposits.
Credit 4

CBCB-310 Legal Environment of Business
Registration #0202-310
Foundation course which introduces: the function of law in society; the fundamentals of the federal and state court systems; contract formation (offer, acceptance, consideration, and capacity) and related ethical issues; and the emergence of the federal regulatory agencies and the practical impact of these agencies on the American business community.
Credit 4

CBCB-335 International Law
Registration #0202-335
Introductory course in international business law that covers both the international aspects of traditional business law subjects (sales, commercial paper, corporate law, agency, etc.) as well as those subjects generally considered to be more "environmental" in nature (antitrust law, administrative law, ethics, trade regulation, employment law, criminal law, ecological concerns, etc.).
Credit 2

Data Processing and Systems Analysis

CBCC-321 Data Processing Principles
Registration #0203-321
Introduction to computer technology including an examination of the current concepts, functions and techniques associated with information processing. This course includes discussion and practical examples of the interrelatedness of computer operations, programming, and systems analysis. Typically includes minimal introductory exposure to computer lab and a few computer applications assignments.
Credit 4

CBCC-322 Data Processing Systems
Registration #0203-322
Covers the spectrum of management considerations pertaining to the use of computers in business systems. Provides a methodology for effective planning, development, installation, and management of computer based business information systems. (CBCC-321 or equivalent)
Credit 4

Finance

CBCD-204 Personal Financial Management
Registration #0204-204
The main objective of this course is to enable you to manage your personal finances more effectively. The course deals with personal budgeting, protection of personal assets, consumer credit, investments, and estate planning.
Credit 4

CBCD-334 International Money, Banking and Finance
Registration #0204-334
An introductory course that leads students to an understanding of international trade, banking, and finance, using microeconomic analysis and a number of relevant examples, both hypothetical and real world. Provides students with an understanding of the theoretical principles of international trade, the function(s) of international financial systems, and the mechanics of international lending. Additionally, the course will explore the benefits of specialization, and conversely, the roadblocks to free enterprise created by various trade policies. This course is an elective for the International Business and Culture Certificate.
Credit 2

General Management

CBCE-200,201, 202 The Management Process
Registration #0205-200, 201,202
A comprehensive three-quarter course in effective supervision and management for supervisors and potential supervisors. Approximately 50 topics of current importance to supervisors are presented, as well as essential management principles, business communications, and practical supervision techniques. Specific supervisory problems of course participants are discussed in informal sessions and through projects conducted outside the classroom. Instruction is usually guided by a team of management specialists. Lecture-discussion, panel presentations, audiovisual presentation, simulation exercises and case studies. (Course extends over three consecutive quarters and should be taken in sequence.) A management certificate is awarded for successful completion of the course.
Credit 4/Qtr. (12 total)
Small Business Management

CBCE-203 Organization and Management
Registration #0205-203
A general introduction to the major management functions and the organization of business. Topics include business and personal planning, organizing, staffing, implementing, directing, control, time management, appraisal, compensation, organization theories, decision-making, problem solving, influences on managerial decision making, communication, management styles and motivation. Extensive use is made of learning groups in which students work together to discuss and apply concepts. Some out of class time is required to prepare for a learning group presentation.
Credit 4

CBCE-305 Customer Relations Systems
Registration #0205-305
This course is being discontinued; students are advised to substitute Introduction to Quality, CIDA-230 (#0220-230).

CBCE-306 Customer Service Technology
Registration #0205-306
An overview and analysis of technological systems for handling goods and information quickly and cost effectively to maximize customer satisfaction.
Credit 4

CBCE-325 Doing Business in International Markets
Registration #0205-325
This course provides an orientation to conducting business successfully in the global marketplace. Emphasized are manufacturing, management, marketing, sales, technology, transportation, transfer of goods, and those factors that influence commerce in world markets. The course will also introduce the environmental framework of labor, finance, international regulations, competition, cooperative agreements and arrangements, and relevant political and cultural factors. This course is required in the International Business and Culture Certificate.
Credit 4

CBCE-353 Management Science
Registration #0205-353
Foundation course which introduces mathematical modeling and the use of management science in the decision-making process. Mathematical techniques will include: linear programming; the assignment model; the transportation model; inventory control models; critical-path models (PERT/CPM); and computer simulation. Homework assignments will include running "canned" computer application programs. (CBCH-201, 202, 351, 352 and CBCC-321)
Credit 4

CBCE-222 Small Business
Registration #0205-222
Management and Finances
The functions required to successfully manage and finance a small business are presented. A variety of topics include staffing a small business, purchasing and supplier relations, consumer credit policies, and the financial and administrative controls necessary to minimize business risk.
Credit 4

Health Care Management

CBCE-223 Small Business
Registration #0205-223
Marketing and Planning
Presents various successful planning and marketing approaches (including market determination, distribution and pricing strategies). The regulatory environment facing small business is included along with techniques for planning growth.
Credit 4

CBCE-310 Survey of Health Care Systems
Registration #0206-310
An overview of the development, structure, and current forces transforming the health care system. Topics will include the status of the national and regional populations, physician practice and payment, private and government health insurance, the impact of medical technology, manpower issues, hospital services and reimbursement systems, ambulatory care and alternative delivery systems, and mental health and long-term care. (Previous experience or coursework in health care and permission of chair)
Credit 4

CBCE-320 Health Systems Administration
Registration #0206-320
A survey of administration in health care facilities focusing on the application of general management principles in the unique health care environment. Issues such as organizational structures, planning and performance monitoring, personnel management, finance and the respective roles of medical professional and administrator in managing the facility will be discussed. (CBCE-310 or previous experience or coursework in health care and permission of chair)
Credit 4

CBCE-351 Health Care Economics and Finance
Registration #0206-351
This course will provide a knowledge of the efficiency, effectiveness, and equity of the new economics of health care, and a conceptual and practical knowledge of health care finance, including sources of funding, accounting and reporting, and the influence of third-party payers. No previous work in economics is assumed. (CBCE-310 or 320)
Credit 4

CBCE-421 Legal Aspects of Health Care Administration
Registration #0206-421
An overview of statute and regulation as they apply to the health care field. 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. (CBCE-310 or 320)
Credit 4
CBCF-431 Health Care Quality Assurance
Registration #0206-431
An introduction to quality assurance in health care. Course will explore past and current definitions of quality and competing concepts of quality assurance; will review existing quality assurance requirements and accrediting organizations, federal and state agencies, and third party payers; will describe and explain quality assurance methods and tools and their application in various settings. (CBCF-310 or 320)
Credit 4

CBCG-441 Health Planning and Program Development
Registration #0206-441
A review of the methodology of planning effectively for health care services. The use of data systems, forecasting, and identifying and analyzing problems is explored, along with the process of strategic planning, setting priorities, developing projects, and allocating resources. Students will prepare actual applications for new programs to regulatory agencies. (CBCF-310 or 320)
Credit 4

Marketing

CBCG-210 Effective Selling
Registration #0207-210
Investigates the importance of the sales function within the overall marketing organization and the necessary general characteristics of a successful salesperson. The various steps of the sales process and the practical applications of effective sales presentation are discussed.
Credit 4

CBCG-213 Advertising Principles
Registration #0207-213
Social, economic and mass communication aspects of advertising with special emphasis on the role of advertising in the marketing mix. Special topics include agency/client relationship, radio and TV ratings, history of advertising, the creative process and psychographics. Guest lectures discuss corporate campaigns.
Credit 4

CBCG-214 Advertising Evaluation and Techniques
Registration #0207-214
Course presents basic approaches used in planning, preparation and evaluation of advertising and sales promotional materials. Course incorporates a number of projects involving writing/layout/production for print, broadcast and specialized media advertising.
Credit 4

CBCG-333 International Advertising and Public Relations
Registration #0207-333
An examination of the various elements that must be considered when embarking on a marketing support program for products or services in countries outside the continental United States. The course will follow the traditional domestic path of marketing support activities of advertising and public relations but will identify the important differences that occur when following that path in international markets. Further, the course will provide experience in methods for dealing with these differences. Major areas of study will include standardization of localization, agency operations, international language or culture considerations, media planning and analysis, international communication, the processes and production of marketing plans, and strategy selection. This course is an elective for the International Business and Culture Certificate.
Credit 2

CBCG-361 Marketing
Registration #0207-361
An introductory course in marketing designed to provide a better awareness of the function of marketing and how marketing relates to other areas of business. Topics include the marketing concept, developing a product strategy, behavioral aspects of consumer marketing, the marketing mix, segmentation and current marketing issues.
Credit 4

CBCG-362 Marketing Practices for the Service Economy
Registration #0207-362
Focuses on applications of traditional marketing concepts and techniques to the service sector (e.g., banking, health care, transportation, and services within organizations) to optimize quality, customer satisfaction, and sales/revenues/profits. Includes a brief review of the increased role of services in the economy.
Credit 4

CBCG-398 Special Topics
Registration #0207-398
Special topics are experimental courses offered quarterly. Watch for titles in the course listing each quarter.
Credit Variable

Mathematics and Statistics for Business

CBCH-201,202 Mathematics for Business
Registration #0208-201, 202
An introduction to mathematical concepts and quantitative methods required in business management. Included are: sets and real number system, linear, non-linear and exponential functions; and system of equations and inequalities. Differential and integrated calculus is introduced plus some special topics in quantitative analysis such as linear programming and simulation.
Credit 4/Qt.

NOTE: Entering students who want to register for CBCH-201 are required to take a diagnostic examination to determine the level at which they may start the sequence. Students who have had previous college level mathematics courses should consult with an advisor.

CBCH-351,352 Business Statistics
Registration #0208-351,352
An introduction to the basic tools of statistical analysis used in business including charts, frequency distribution, averages, dispersion, probability theory, sampling. Logical procedures for making business decisions under conditions of uncertainty are emphasized. Hypothesis testing including one, two, and k-sample test means, proportions, regression and correlation analysis are also included. (CBCH-202)
Credit 4/Qt.

Personnel Administration

CBCI-224 Interviewing Techniques
Registration #0209-224
A practical approach to interviewing techniques with emphasis on role plays and case studies. Coverage includes employment, disciplinary, counseling, and performance appraisal interviews.
Credit 4
This course examines problems and solutions related to establishing realistic and attractive wages and career paths for employees in service sector businesses. In addition, it explores motivation, training and communication techniques that lead to the kind of quality performance required in service industries and organizations to optimize customer satisfaction.

Credit 2

An introduction to personnel administration including an overview and discussion of employment, equal employment opportunity, job evaluation, training, performance appraisal, compensation, benefits, personnel planning, labor relations, and other related topics.

Credit 4

The organization of production functions with emphasis on management responsibilities. All levels of factory operation are discussed and relationships between various aspects of production are presented.

Credit 4

An overview of industrial engineering problems and techniques is presented including facilities selection and layout, methods analysis, work measurements, operations planning and control materials handling and an introduction to operations research.

Credit 4

The economic factors required for rational decisions are presented. Emphasis is placed on analytical tools used in a manufacturing environment including evaluation of capital spending alternatives, depreciation methods, decision-making under risk conditions, and value analysis methods.

Credit 4

As the marketplace becomes increasingly oriented toward the international exchange of goods and services, the International Organization of Standards continues to develop a set of quality standards assuring that goods and services produced by a supplier are capable of meeting the requirements of customers around the globe. This course will address the emerging developments of international standards in terminology and quality standards. It will also consider manufacturing standardization in such industries as telecommunications and electronics. This course is an elective for the International Business and Culture Certificate.

Credit 2

Overview of the transportation and logistics industry as a vital part of the nation's social and economic structure. Introduces basic understanding of the functional areas of logistics management and their interrelationships. The purchase and use of transportation services as related to the firm's logistical mission is emphasized.

Credit 4

Introduces the basic skills required to move materials in support of the logistics function internationally. Includes discussions of duties, customs regulations, and the various instruments used to facilitate international trade.

Credit 4

This course introduces students to the logistics, cultural systems, and transportation systems and regulations necessary to transact economic trade throughout the world. Topics include documentation procedures, regulations, related services, and techniques used to reduce the costs of international trade. This course is an elective for the International Business and Culture Certificate.

NOTE: Not for Logistics and Transportation Management majors

Credit 2

Comprehensive study of real estate principles including: law of agency, human rights and fair housing, real estate instruments, financing, valuation and listing, contracts, license law and ethics, closings, land use regulations, and real estate math. Completion of this course satisfies the NYS educational requirement for a real estate salesperson's license. For licensure, participants must meet 90% attendance (40 1/2 hours) requirement and pass the final exam. Individuals interested in licensure only should call 475-5079.

Credit 4

A study of topics related to real estate including: operation of a broker's office, construction, general business law, subdivision and development, leases, taxes, assessments, investment property, alienation, property management, condominiums and cooperatives, rent regulations, appraisals, and advertising. Completion of this course and Basic Real Estate Principles satisfies the educational requirement for a real estate broker's license. For licensure, participants must meet 90% attendance (40 1/2 hours) requirement and pass the final exam. Individuals interested in licensure only should call 475-5079.

Credit 4
CBCM-203 Real Estate Investment and Finance
Registration #0213-203
An introduction to real estate investment with emphasis on the purchase and sale of real estate, the acquisition of financing, the selection of appropriate ownership forms, and the use of statistical data in making real estate decisions.

For license renewal this course is approved by NYS Department of State as a 30-hour course with exam.
Credit 4

CBCM-212 Residential Properties Management
Registration #0213-212
An introductory course focusing on the application of management principles to residential properties. The course is geared to the property manager rather than the on-site manager. Topics include: property analysis, the relationship between management and value, the scope and history of property management, marketing, and apartment operation and administration. This course has been designed in cooperation with the Institute of Real Estate Management and may qualify the student to receive elective credit toward the Certified Property Manager (CPM) designation awarded by IREM.
Credit 4

Interdisciplinary Studies

CIDA-220 Introduction to Quality Registration #0220-220
This course is designed specifically for adults who want to know more about themselves—their talents and skills—so that they can make informed career choices and realistic educational plans. Using skills and interest inventories, class discussion, individualized and group activities, assigned readings and papers, students will be able to assess their individual goals, interests and abilities.
Credit 2

CIDA-230 Introduction to Quality Registration #0220-230
An introduction to the fundamental concepts of total quality management. Includes an overview of the competitive environment, the cost of non-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 implications of quality management concepts for organizational structure and roles, decision making, and interpersonal relations.
Credit 4

CIDA-231 Basic SQC Techniques Registration #0220-231
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 tools for diagnosing sources of variation; construction and interpretation of charts for variables and attributes; tolerances, specifications, and process capability. Product quality (i.e., high yield) and product reliability are also addressed. (High school algebra or equivalent)
Credit 4

CIDA-270 Methods of Inquiry Registration #0220-270
This course is designed to provide students with analytical thinking skills and strategies that are effective across academic disciplines. The process of "learning to learn" considers an individual's natural learning skills and how to apply them to academic work. The importance of questioning in the active learning process is established through guided instruction. The application of skills to current academic course work is reinforced through small group sessions and carefully monitored independent student self-assessment.
Credit 4

CIDA-330 Leadership Skills for Quality Registration #0220-330
Analytical and behavioral strategies and techniques for providing leadership in quality management. Includes examination of problem-solving models and processes; personal values related to leadership; and behavioral, conceptual, and communication skills for successful team building and team working, conferencing, negotiating, and assessing and promoting quality behavior. Case studies, interactive simulations, and assessment of individual leadership characteristics. (CIDA-230)
Credit 4

CIDA-340 Statistics for Total Quality Registration #0220-340
An introductory course in statistics and probability that emphasizes the analysis and interpretation of variation in quality control. Topics include descriptive statistics (statistical tables and graphs, measures of central tendency, and dispersion), a brief overview of probability theory, probability distributions, sampling distributions, confidence interval estimates, and one- and two-sample hypotheses tests of means and proportions. The statistical package MINITAB is used extensively by the instructor to illustrate statistical procedures and by students to complete assignments. (CIDA-231 or approval of department)
Credit 4

CIDA-410 Costing for Quality Registration #0220-410
An introductory course in the decision-making process used for determining and evaluating the cost of quality in support of manufacturing, government, or service industries. Topics include a review of basic accounting procedures and financial statements, an introduction to cost accounting, an analysis of items that are directly and indirectly affected by conformance or non-conformance to customer requirements. (Certificate in Basic Quality or approval of department)
Credit 2

CIDA-430 Implementing Total Quality Registration #0220-430
Theory and techniques for introducing and institutionalizing quality management concepts and practices in all areas of organizational activity. Includes fundamental principles of organizational development, model programs for improving quality throughout the organization, and techniques for analyzing organizational culture and identifying and remediating barriers to quality management. Introduces benchmarking and identifying and translating customer requirements as the foundations of the implementation process. (CIDA-340 and 410)
Credit 4 (Not expected to be offered in the coming year)
CIDA-440 Creative Critical Thinking and Problem Solving
An inter-disciplinary approach to the generation and evaluation of ideas and solutions. Includes analysis of the conditions limiting creativity and the development of a "tool kit" 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.
Credit 4

CIDA-501 Honors Seminar
An interactive seminar for advanced students that focuses on interdisciplinary issues of wide interest and application. Course theme and content change periodically, ranging from "Creative Critical Thinking and Problem Solving" to "Negotiation and Conflict Resolution," "Microeconomic Battle Plans," and "Organizational Culture." Limited to qualified Applied Arts and Science BS degree students. (Approval of advisor)
Credit 4

Ceramics

CHAC-201 Introduction to Ceramics
An extensive survey of on and off the wheel forming techniques using stoneware and porcelain clays. Students will be introduced to a variety of decorative methods as well as the basics of glazing and firing finished work. Class projects will emphasize the development of competent skills and good design.
Credit 2

CHAC-211 Intermediate Ceramics
An exploration of Japanese wheel-throwing techniques. Students will work with raku stoneware and porcelain, using methods and tools common to Japanese potters. Class projects will concentrate on production techniques with special emphasis being given to glazing and firing procedures. (CHAD-201 or equivalent)
Credit 2

CHAC-301 Advanced Ceramics
An introduction to the world of the professional potter. Work will center on advanced forming and decorative techniques ranging from sectional throwing to photo-sensitive emulsion glazing. Special emphasis will be on independent projects which require the potter to master clay and glazing formulation, design, production and firing techniques. Kiln design and construction as well as marketing techniques for finished work will be discussed. (CHAC-211 or equivalent)
Credit 2

CHAC-240 Ceramic Wheel-Throwing Techniques
A broad survey of wheel-throwing skills with an emphasis on developing the student’s ability to create well-designed, functional wares.
Credit 2

CHAC-243 Porcelain Techniques
An intensive introduction to porcelain with an emphasis on Japanese techniques of throwing, finishing and glazing. Basic wheel-throwing skills are required.
Credit 2

CHAC-245 Earthenware Techniques
An intensive introduction to earthenware with an emphasis on exploring the characteristics of unglazed, functional and sculptural forms.
Credit 2

CHAC-295 Independent Study: Ceramics
Independent study may be developed at upper division level. Projects must be developed with instructor, subject to the approval of the program director. Credit may vary from one to five quarter-credits. For information on independent study contact the Division of Business and the Arts.
Credit Variable

CHAC-298 Special Topics: Ceramics
Special topics are experimental courses announced quarterly. Watch for titles in the course listing each quarter.
Credit Variable

Design

CHAD-201,202, 203 Basic Design
Study of basic elements of design: line, shape, texture, color, space and their incorporation in design principles as applied to two- and three-dimensional design problems including the graphic arts.
Credit 2/Qtr.

CHAD-211,212,213 Display Design
First quarter examines the fundamentals of three-dimensional design. The second and third quarters apply these principles to develop mechanical, graphic and model making manipulative skills and problem solving approaches used by designers in space planning. (CHAF-201, 202, 203 and CHAD-201, 202, 203 or equivalent experience)
Credit 2/Qtr.

CHAD-215, 216, 217 Rendering Techniques
This course will introduce students to the materials and techniques used by designers in rendering interiors, layouts, products, etc. Marker sketching, perspective, shadowing, media selection, and presentation techniques will be covered. Suggested for all design students. (CHAF-201, 202, 203; CHAD-201, 202, 203 or equivalent)
Credit 2/Qtr.

CHAD-220 Art for Reproduction
This course prepares students to enter the field of graphic design by providing orientation and the studio experience in the presentation of imagery for reproduction. Presentations will include board techniques, materials, tools, mechanical art procedures, printing and bindery processes, etc. (CHAD-201, 202, 203 or equivalent)
Credit 3
CHAD-224, 225  
**Interior Design**  
Registration #0223-224, 225  
Career orientation. Emphasis on practical aspects of the profession. Details of purchasing all furnishings used in a home. Client centered planning and design. (CHAF-201, 202, 203; CHAD-201, 202, 203 or equivalent)  
Credit 2/Qtr.

CHAD-226  
**History of Interior Design**  
Registration #0223-226  
Historical survey of period decoration and furniture styles from antiquity to the present.  
Credit 2

CHAD-227  
**Business Aspects of Environmental Design**  
Registration #0223-227  
This course will introduce students to the various occupations available to the environmental and interior designer, and instruct them in the use of their artistic and technical skills to obtain employment and establish themselves in the design community. Dealing with clients, vendors, and contractors will also be covered. Assignments will be structured to meet the personal business needs of each student.  
Credit 2

CHAD-231  
**Color Theory in Art**  
Registration #0223-231  
An opportunity to develop an awareness of and sensitivity to the world of color through slide lectures, class discussion and instructor's evaluation. Emphasis on the visual impact of color. (CHAD-201, 202, 203 or equivalent experience)  
Credit 2

CHAD-235  
**Commercial Interior Design**  
Registration #0223-235  
Students will learn to develop a good commercial interior plan given clear specifications and boundaries. Presentation techniques, client relations and fee philosophy will also be discussed with frequent field trips and guest speakers. (CHAD-224, 225 or equivalent)  
Credit 2

CHAD-251, 252, 253  
**Environmental Design**  
Registration #0223-251, 252, 253  
The study of enclosed space, using material and the elements of design, line form, texture, and color to develop living space. (CHAD-201, 202, 203 and CHAD-201, 202, 203 or equivalent experience)  
Credit 2/Qtr.

CHAD-260  
**Marker Rendering Techniques**  
Registration #0223-260  
Students will be introduced to marker techniques and materials used in rendering layouts, interiors, products and illustrations. Other mediums will be united with marker to develop shadow and highlighting, sketching and presentation techniques.  
Credit 2

CHAD-261, 262, 263  
**Advanced Design and Typography**  
Registration #0223-261, 262, 263  
Study of commercial layout procedures from rough layouts to comprehensives, type selection, copy fitting, pictorial indication and production procedures as related to contemporary practices. Course emphasizes the design, structure, historical development and techniques of typography. Proceeds from rough letter indication to development of finished lettering, and application in commercial advertising problems. Typography and photo lettering methods will be studied in relationship to their use in commercial design. (CHAF-201, 202, 203 and CHAD-201, 202, 203)  
Credit 2/Qtr.

CHAD-270  
**Graphic Communication for the Non-Artist I**  
Registration #0223-270  
Introduces basic skills in communication graphics, including: elements of design (line, shape, texture, color, space) and their application to two-dimensional projects; typography and commercial layout procedures (from rough layouts to comprehensives); and rendering techniques (marker sketching, shadowing, and perspective). Course is designed for people with little or no previous art training. Lecture/demonstration and studio format; student projects followed by critiques.  
Credit 3

CHAD-271  
**Graphic Communication for the Non-Artist II**  
Registration #0223-271  
An exploration of current approaches to solving graphic design problems in the communications professions, applying basic skills in design, lettering and layout, and rendering, with emphasis on the use and selection of art materials, photographs, and photographic/electronic image producing equipment; and an exploration of design in the advertising process, involving planning, creating, producing, and evaluating media. (CHAD-270 or equivalent)  
Credit 3

CHAD-301, 302  
**Advertising**  
Registration #0223-301, 302  
Advertising is planned, created and placed by bright, inquisitive, hard working people in a fast paced, time-conscious business. They work within limits of budgets, marketing objectives, research, media, competitors' actions and a growing list of government regulations. This course examines the world of advertising and what is required to create advertising campaigns by tracing a campaign development step by step.  
Credit 4/Qtr.

CHAD-311, 312, 313  
**Graphic Design**  
Registration #0223-311, 312, 313  
A contemporary approach to design for printed advertising with the emphasis on creative experience. The purpose of this course is to provide a working knowledge of the field of graphic design, its history, its future, and general practices among current professionals. The role of the graphic designer in the communications field and how the designer actually implements that role will be discussed. (CHAF-201, 202, 203; CHAD-201, 202, 203 or equivalents. CHAD-261, 262, 263 recommended)  
Credit 2/Qtr.

CHAD-315, 316, 317  
**Advertising Design**  
Registration #0223-315, 316, 317  
The functions and skills of the art director touch on all phases of advertising art from concepts and professional studio procedures to practical approaches in design and production. (CHAF-201, 202, 203 and CHAD-201, 202, 203 or equivalent experience. CHAD-261, 262, 263 and 311, 312, 313 recommended)  
Credit 2/Qtr.
CHAD-360 Portfolio Workshop
Registration #0223-360
A workshop designed to help students take what they have learned in art classes (or work situations) and prepare and present a portfolio. Students will produce a resume and cover letter appropriate to their career goals. Projects will be tailored to the needs of individual students, allowing them to compile an accurate representation of their skills in a concise, positive, and beneficial manner. Visits from prominent people in the field showing their work and sharing their experiences.
Credit 2

CHAF-295 Independent Study: Design
Registration #0223-295
Independent studies may develop at the upper division level. Projects must be developed with instructor, subject to approval of the program chairperson or the Division of Business and the Arts. Credit may vary from one to five quarter-credits. For information on independent study contact the Division of Business and the Arts.
Credit Variable

CHAF-298 Special Topics: Design
Registration #0223-298
Special Topics are experimental courses announced quarterly. Watch for titles in the course listing each quarter.
Credit Variable

Drawing
CHAF-201 Basic Drawing and Media
Registration #0224-201, 202, 203
An intense study of the fundamentals of drawing and application of media, designed to develop a flexible, creative mind capable of interpreting ideas. Specific emphasis is placed on problems confronting the student who has had little or no drawing experience.
Credit 2/Qtr.

CHAF-207 Basic Figure Drawing
Registration #0224-207
Drawing from the costumed and nude model. The student makes a visual analysis of action and gesture through quick sketches. Short poses gradually extend to longer studies so that the student can develop techniques, skills and the control of media. (CHAF-201, 202, 203 or equivalent)
Credit 2

CHAF-210 Interpretive Landscape Drawing
Registration #0224-210
Students will sketch directly from nature on location during field trips. In subsequent studio sessions compositions translating first impressions using various media will then be developed. Special attention will be given to individual approaches and expression.
Credit 2

CHAF-306 Advanced Drawing
Registration #0224-306
Drawing in a variety of media, including an introduction to line, form and color as elements of pictorial expression. Presents organic, inorganic, and imaginative stimuli. May be elected more than once for credit. (CHAF-201, 202, 203; CHAD-201, 202, 203 or equivalent)
Credit 2

CHAF-307 Figure Drawing
Registration #0224-307
Drawing from the costumed and nude model for combined action and figure construction. Short poses gradually extended to longer studies for sustained attention to the problem. May be elected more than once for credit. (CHAF-207 or equivalent recommended)
Credit 2

Painting
CHAF-211 Introduction to Painting
Registration #0224-211
Study of the materials and techniques of painting through use of still-life and nature forms. Basic training and foundation for advanced work. (CHAF-201, 202, 203; CHAD-201, 202, 203 or equivalents)
Credit 2

CHAF-301 Portrait Painting
Registration #0224-301
Painting with opportunities for gifted and advanced students to explore media, seek new skills, develop a new style of expression. The instructor, an accomplished artist, works individually with the student. Models are available on a limited basis. Still-life and sketches will be used for inspiration. May be elected more than once for credit. (CHAF-211 or equivalent)
Credit 2

CHAF-227 Figure Painting
Registration #0224-227
Painting from costumed and nude models. The emphasis is placed on action, structure, gesture, composition, experimental attitudes and techniques. The student is provided with an opportunity to achieve clear understanding of various media in his or her individual search for expression. May be elected more than once for credit. (CHAF-307 or equivalent)
Credit 2

CHAF-337 Portrait Painting
Registration #0224-337
Particular attention is given to the development of anatomical understanding. Several media will be explained. Emphasis will be placed on understanding various aesthetic and craft traditions. Individual attention is supplemented by demonstrations and discussions with the instructor who is an active portrait artist in the community. May be elected more than once for credit. (CHAF-207 and CHAF-211 or equivalents)
Credit 2

CHAF-341 Watercolor Painting
Registration #0224-341
Basic study of watercolor media, methods, and techniques. Students receive individual as well as group instruction with emphasis on composition, color, and personal expression. Media: watercolor, tempera, and casein. May be elected more than once for credit. (CHAF-201, 202, 203 or equivalents)
Credit 2
Sculpture

CHAF-247 Sculpture
Registration #0224-247
Study of basic theories of form and space utilizing sculptural processes and techniques. Solutions to problems, traditional and modern, are achieved through exercises using various materials such as clay, wood, plaster, plastic. Through discussion and practice, the student is introduced to the proper use of the sculptor's tool and methods. (CHAF-201, 202, 203 and CHAD-201, 202, 203 or equivalents)
Credit 2

CHAF-357 Sculpture Workshop
Registration #0224-357
An in-depth study of sculptural methods, techniques and materials (clay, wood, plaster, stone and welded metal). Students may concentrate in one material. May be elected more than once for credit. (CHAF-247)
Credit 2

Illustration

CHAF-361 Illustration
Registration #0224-361
Fundamentals of visualization and pictorial organization in terms of advertising and editorial illustration. Emphasis on contemporary graphics procedures. May be elected more than once for credit. (CHAF-207 or equivalent)
Credit 2

CHAF-362 Airbrush Techniques
Registration #0224-362
This course is designed to provide an opportunity for beginners to develop the basic skills and techniques of painting with an airbrush and allow experienced users to enhance their skills. Graphic artists, fine artists, illustrators, and photographers can benefit from this exposure to airbrush techniques and applications through demonstration and experiential learning. Class will be limited to 10 students. (CHAD-201, 202, 203 and CHAF-201, 202, 203 or equivalent)
Credit 3

CHAF-230 Collage
Registration #0224-230
A basic study of the history, materials, and techniques used in collage. Students will explore a variety of materials used by past and contemporary artists and then apply these techniques to develop their own work. May be elected more than once for credit. (CHAD-201, 202, 203; CHAF-201, 202, 203)
Credit 2

CHAF-263 Calligraphy
Registration #0224-263
This course will introduce students to either the Foundational or Italic form of lettering. Students will explore the history, theory, and techniques that have shaped letter forms as we know them today. Emphasis will be placed on developing skills and knowledge through the study of historic and contemporary forms as well as through the use of a variety of tools and materials. Areas to be studied include majuscules, minuscules, rhythm, spacing, techniques, media, color, design, page layout, and either the mechanics of bookbinding or camera ready art.
Credit 2

CHAF-363 Calligraphy Workshop
Registration #0224-363
Further study in the methods and techniques of calligraphy. Students will be able to pursue study in a variety of styles and letter forms in a concentrated manner. May be elected more than once for credit. (CHAF-263 or equivalent)
Credit 2

Printmaking

CHAF-296 Introduction to Printmaking
Registration #0224-296
An introduction to the methods, materials, tools, and techniques of printmaking. Areas covered may include woodcut, etching, engraving, stencil, collographs, and lithography. Students are required to pull an edition of print in one area. (CHAF-201, 202, 203 and CHAD-201, 202, 203 or equivalents)
Credit 2

CHAF-397 Printmaking Workshop
Registration #0224-397
Further study of methods and techniques of etching, lithography and relief printing. Students may concentrate in one print medium. May be elected more than once for credit. (CHAF-296)
Credit 2

CHAF-295 Independent Study: Fine Arts
Registration #0224-295
Independent studies may be developed at the upper level. Projects must be developed with an instructor, subject to approval of the program chairperson or Division of Business and the Arts. Credit may vary from one to five quarter-credits. For information on independent study contact the Division of Business and the Arts.
Credit Variable

CHAF-298,398 Special Topics: Fine Arts
Registration #0224-298, 398
Special topics are experimental courses announced quarterly. Watch for titles in the course listing each quarter.
Credit Variable

Metalcrafts and Jewelry

CHAM-201 Introduction to Metalcrafts and Jewelry
Registration #0225-201
Emphasis will be placed on basic jewelry making techniques involving sawing, filing, soldering, hand and machine finishing techniques, simple stone setting and more. Design will be stressed throughout the course. May be elected more than once for credit.
Credit 2

CHAM-211 Intermediate Metalcrafts and Jewelry
Registration #0225-211
Work of a more complex nature will be introduced. Some techniques included will be surface treatment of metal, more sophisticated stone setting, basic hollowware, casting and more. Independent and creative statements will be emphasized in keeping with the student's technical and aesthetic development. May be elected more than once for credit. (6 credits CHAM-201 or presentation of portfolio)
Credit 2
CHAM-301 Advanced Metalcrafts and Jewelry
Registration #0225-301
For advanced students in the arts and crafts interested in and capable of exploring a particular area. Content and method decided by conference between student and instructor and directed toward development of student’s own creative ability. Advanced level academic credit is variable in proportion to class and outside assignments scheduled. May be elected more than once for credit. (Presentation of portfolio)
Credit 2

CHAM-298 Independent Study: Metalcrafts/Jewelry
Registration #0225-298
Independent studies may be developed at the upper division level. Project must be developed with instructor, subject to approval of the program chairperson or the Division of Business and the Arts. Credit may vary from one to five quarter-credits. For information on independent studies contact the Division of Business and the Arts.
Credit Variable

CHAM-295 Special Topics: Metalcrafts and Jewelry
Registration #0225-295
Special topics are experimental courses announced quarterly. Watch for titles in the course listing each quarter.
Credit Variable

Weaving/Textiles

CHAT-201 Introduction to Weaving
Registration #0226-201
An introduction to the materials, processes and techniques of weaving. Emphasis on basic skills includes fiber analysis, yam calculations, warping loom dressing, four-harness loom techniques, finishing, designing, drafting and color effects. May be elected more than once for credit.
Credit 2

CHAT-211 Intermediate Weaving
Registration #0226-211
A continuation in the development of weaving techniques and design skills through advanced study of color effects, drafting, four-harness and tapestry techniques. The course will include samples of a particular technique plus home assignments and a final project to satisfy individual needs. May be elected more than once for credit. (6 credits CHAT-201 or presentation of portfolio)
Credit 2

CHAT-301 Advanced Weaving
Registration #0226-301
For advanced students in the arts or crafts interested in and capable of exploring a particular area. Content and method decided before registration by conference between student and instructor and directed toward development of student’s own creative ability. Advanced level academic credit is variable in proportion to class and outside assignments schedules. May be elected more than once for credit. (Presentation of portfolio)
Credit 2

CHAT-295 Independent Study: Weaving/Textiles
Registration #0226-295
Independent studies may be developed at the upper division level. Projects must be developed with the instructor, subject to the approval of the program chairperson. Credit may vary from one to five quarter-credits. For information on independent study contact the Division of Business and the Arts office.
Credit Variable

CHAT-298 Special Topics: Weaving/Textiles
Registration #0226-298
Special topics are experimental courses announced quarterly. Watch for titles in the course listing each quarter.
Credit Variable

Woodworking

CHAW-201 Introduction to Woodworking
Registration #0227-201
Elementary problems in choice of woods, joinery, finishing, use and care of hand tools, and basic procedures in machine woodworking. Suggested introductory project: Construct a dovetailed box from a hardwood with hand cut dovetails. May be elected more than once for credit. Class limited to 20 students.
Credit 2

CHAW-211,212,213 Intermediate Woodworking
Registration #0227-211, 212, 213
Students who have acquired the ability to use hand and powered tools will advance at their own pace on an individually challenging technique and project. The development of design skills and technical ability will be emphasized. May be elected more than once for credit.
Credit 2/Quart.

CHAW-301 Advanced Woodworking
Registration #0227-301
For advanced students in the arts or crafts interested in and capable of exploring a particular area. Content and methods decided before registration by conference between student and instructor and directed toward development of student’s own creative ability. Advanced level academic credit is variable in proportion to class and outside assignments scheduled. May be elected more than once for credit. (Presentation of portfolio)
Credit 2

International Studies

CHGI-211 Chinese Language and Culture: China and the Chinese People
Registration #0233-211
Introduces basic Chinese culture as well as 100 daily conversational sentences. The emphasis in this quarter will be on Chinese culture characteristics, traditional philosophies and religions, beliefs, family structure, political life, economic system and trade practices, especially when these impact on contemporary practices.
Credit 4
CHGD-211 Sign Language & Manual Communications: System I
Develops fluency at a basic level. This course includes introduction and practice of approximately 300 basic signs, theoretical consideration and practice of grammatical features of sign language, fingerspelling and sociolinguistic information regarding the appropriate application of manual communication skills in communicating with deaf persons.
Credit 2

CHGD-212 Sign Language & Manual Communications: System II
A continuation of conversational signing skill development. The course includes 300 additional basic signs, continued practice with the grammatical features of sign language, fingerspelling practice, and further sociolinguistic information regarding the appropriate use of manual communication skills between deaf and hearing persons. (CHGD-211 or equivalent sign skill)
Credit 2

CHGD-213 Sign Language & Manual Communications: System III
The third in a series of basic conversational sign language courses. Introduces the student to approximately 300 additional signs, continues the practice of the grammatical features of sign language, refines fingerspelling skills, and further develops students' sensitivity to the use of manual communication by deaf and hearing persons. (CHGD-212 or equivalent sign skill)
Credit 2

CHGD-212 Sign Language & Manual Communications: System II
Continues an introduction to basic Chinese culture as well as 100 daily conversational sentences. This quarter's emphasis is on the special features of Chinese communism, their trade ideologies and practices, their general relationships with foreign countries, internal developments and conflicts.
Credit 4

CHGD-213 Sign Language & Manual Communications: System III
Continues an introduction to Chinese culture as well as 100 daily conversational sentences. This quarter's emphasis is on the contemporary issues, their relations with the United States, their business practices. During the third quarter more time will be spent on language practice and students' independent work. It is more beneficial if students have had at least one of the two previous courses.
Credit 4

CHGI-212 Japanese Language and Culture: Communism Ideology and Practice
Registration #0233-212
Continues an introduction to basic Chinese culture as well as 100 daily conversational sentences. This quarter's emphasis is on the special features of Chinese communism, their trade ideologies and practices, their general relationships with foreign countries, internal developments and conflicts.
Credit 4

CHGI-213 Japanese Language and Culture: Contemporary Issues
Registration #0233-213
Continues an introduction to Chinese culture as well as 100 daily conversational sentences. This quarter's emphasis is on the contemporary issues, their relations with the United States, their business practices. During the third quarter more time will be spent on language practice and students' independent work. It is more beneficial if students have had at least one of the two previous courses.
Credit 4

CHGI-221 Japan: The Changing Tradition
Registration #0233-221
What are the foundations of Japan's economic and technological success? This course considers the economy, government, and society of modern Japan and traces its emergence from the first contacts with the West in the 1500s to its present position as a leading economic power. This course may serve as a social science elective.
Credit 4

Deaf Studies
CHGD-211 Sign Language & Manual Communications: System I
Develops fluency at a basic level. This course includes introduction and practice of approximately 300 basic signs, theoretical consideration and practice of grammatical features of sign language, fingerspelling and sociolinguistic information regarding the appropriate application of manual communication skills in communicating with deaf persons.
Credit 2

CHGD-212 Sign Language & Manual Communications: System II
A continuation of conversational signing skill development. The course includes 300 additional basic signs, continued practice with the grammatical features of sign language, fingerspelling practice, and further sociolinguistic information regarding the appropriate use of manual communication skills between deaf and hearing persons. (CHGD-211 or equivalent sign skill)
Credit 2

CHGD-213 Sign Language & Manual Communications: System III
The third in a series of basic conversational sign language courses. Introduces the student to approximately 300 additional signs, continues the practice of the grammatical features of sign language, refines fingerspelling skills, and further develops students' sensitivity to the use of manual communication by deaf and hearing persons. (CHGD-212 or equivalent sign skill)
Credit 2

CHGD-241 Aspects & Issues of Deafness I
Registration #0234-241
Develops knowledge and understanding of the effects of hearing impairment, particularly with regard to the audiological, psychological, educational and vocational implications. Class activities include a simulated deafness experience, films, lectures and discussions.
Credit 3

CHGD-242 Aspects & Issues of Deafness II
Registration #0234-242
Examines deafness from a cultural perspective, focusing on: what constitutes culture, what characterizes deaf culture, dynamics of interaction between the deaf and the larger community, and historical perspectives on deaf heritage. Films, individual case studies, cultural simulation, discussions and lecture will be implemented. (Recommended: CHGD-241)
Credit 3

CHGD-311 American Sign Language I
Registration #0234-311
This course is designed to continue sign language skill development as the language is used among deaf community members. Students are exposed to many new signed expressions: grammar, syntax and lexical items of A.S.L. Videotapes, dialogues, language games, lecture and readings are used in presentation of this content. (CHGD-213 or equivalent sign skill)
Credit 2

CHGD-312 American Sign Language II
Registration #0234-312
The second in a series of American Sign Language courses. This course continues the study of grammar, syntax and lexical items of A.S.L. Cultural aspects of the deaf community are considered as they relate to the language of deaf people. (CHGD-311 or equivalent sign skill)
Credit 2

Humanities
CHGH-201 Humanities
Registration #0235-201
An interdisciplinary course in which literature, architecture, art, music and philosophy are related to selected historical, economic and scientific forces that have shaped western civilization. Part of a three-course sequence, this course is concerned with the modern period, from the end of the Romantic Age to the present day. Despite the relatedness of these three courses, any of them can be taken alone, and no one course is prerequisite to either of the others.
Credit 4

CHGH-202 Humanities
Registration #0235-202
An interdisciplinary course in which literature, architecture, art, music and philosophy are related to selected historical, economic and scientific forces that have shaped (particularly) western civilization. Part of a three-course sequence, this course focuses on ancient Greece, Rome and Israel, as well as the Middle Ages. This course has no prerequisites, nor does it serve as prerequisite for other courses.
Credit 4
CHGH-203  Humanities
Credit 4
Registration #0235-203
An interdisciplinary course in which literature, architecture, art, music and philosophy are related to selected historical, economic and scientific forces that have shaped (particularly) western civilization. Part of a three-course sequence, this course focuses on the development of the humanities from the Renaissance through the Romantic Age. This course has no prerequisite, nor does it serve as prerequisite for other courses.

CHGH-207  American Politics
Credit 4
Registration #0235-207
Develop political awareness and the ability to assess contemporary issues and events. With this guide to the theoretical foundations and institutions of our political and governmental system, you will not only gain an understanding of today's political climate, but you will also be better able to separate ideas and concepts from public policy.

CHGH-210  Introduction to Art Appreciation
Credit 4
Registration #0235-210
Examines the elements involved in the creation of the visual arts (painting, sculpture, architecture) and the factors that affect audience response (line, color, texture, rhythm). Particular emphasis given to historical perspectives and organic unity.

CHGH-230  Introduction to Music Appreciation
Credit 4
Registration #0235-230
A study of the elements of music (rhythm, melody, harmony), of different musical styles, and of music in the context of history. Emphasized topics include major musical periods (Rococo, Baroque, Classical, Romantic and Modern). Major composers considered are: Bach, Vivaldi, Handel, Mozart, Haydn, Beethoven, Brahms, Chopin, Tchaikovsky, Liszt, Dvorak, Stravinsky and Copeland.

CHGH-260  Introduction to Literature
Credit 4
Registration #0235-260
An introduction to the elements and distinctive qualities of five varieties of literary experience: poetry, short fiction, film, the novel and briefly, expository prose. Emphasized topics include form, theme, style, versification, and characterization. Although this course is not historically oriented, students will become familiar with cultures from many periods in history.

CHGH-270  Introduction to Philosophy
Credit 4
Registration #0235-270
This course acquaints students with methods of philosophical questioning and argumentation through an examination of major philosophers and the issues they address. Issues to be examined include questions about the nature of knowledge, the nature of reality, ethics, and aesthetics. Emphasis will be placed on a critical examination of the reasoning offered by philosophers in behalf of their views.

CHGH-359  Contemporary Moral Problems
Credit 4
Registration #0235-359
A one-quarter course that presents moral issues which arise in the professions and other vocations of technical expertise. These problems in applied ethics are studied through contemporary literature by moral philosophers (e.g., Habermas, Singer) as well as key classical texts (e.g., those of Plato, Locke, Hume, etc.).

CHGH-323  Modern Europe
Credit 4
Registration #0235-323
An examination of the development of Europe from the 17th century to the present time, with emphasis on theories and concepts of civilization, culture, government, and international relations. Also emphasized: the Industrial Revolution, 19th Century democracies, governmental experiments of the 20th Century, World Wars I and II, and the Post (WWII) War Period.

CHGH-326  Modern America
Credit 4
Registration #0235-326
Traces the emergence of the U.S. as a world power from the time of the Civil War to the present. Stresses problems created at home by continued industrialization and urbanization. Included are such issues as urbanization, civil rights, and the growing political influence of women and minorities.

CHGH-340  Values and Experience
Credit 4
Registration #0235-340
A study of the interaction between values and experience. Focuses on the impact of social institutions (religion, family, education, government) and technological developments on values and beliefs (including the definition of reality). This is a science, technology and humanities elective.

CHGH-341  Symbols, Behavior, Culture and Technology
Credit 4
Registration #0235-341
A study of symbol and sign systems, emphasizing principles and rules that underlie linguistic behavior. Examines the ways in which behavior reflects and influences culture, and the ways in which miscommunication results from technical, behavioral and cultural factors. This is a science, technology and humanities elective.

CHGH-342  Dimensions of Science
Credit 4
Registration #0235-342
A survey and exploration of the impact of science on, and its interactions with, other elements of civilization, such as literature, technology, politics, philosophy, the arts, and human values. This is a science, technology and humanities elective.

CHGH-298  Special Topics: Humanities
Credit Variable
Registration #0235-298
Experimental lower-division courses will be offered under this number; titles will appear in each quarter's course listing.
Communication

NOTE: Students who apply for Dynamic Communication I, CHGL-204, or Communication, CHGL-220, must take a pre-test to determine the course most appropriate for their communication needs. Only students who have credit for CHGL-204, or equivalent, may register for Dynamic Communication II, CHGL-205.

CHGL-204 Dynamic Communication I
Registration #0236-204
The first of a two-course sequence, Dynamic Communication I focuses on writing skills. The achievement of clarity, coherence, logical development of ideas, and effective use of language is emphasized. Basic research techniques are included. (Requires pre-test)
Credit 4

CHGL-205 Dynamic Communication II
Registration #0236-205
This course builds on the skills acquired in Dynamic Communication I, emphasizing organization, support, and effective expression of ideas in papers of several paragraphs. The major exercise is preparation of a position paper and an oral defense of the paper's thesis. Research methods and principles of effective argumentation are studied. (CHGL-204 or equivalent)
Credit 4

CHGL-220 Communication
Registration #0236-220
This course focuses on refining writing skills—emphasizing organization, support, and effective expression of ideas in multi-paragraph papers. The major exercise is preparation of a position paper and an oral defense of the paper's thesis. Research methods and principles of effective argumentation are studied. (Requires pre-test)
Credit 4

CHGL-240 Interpersonal Communication Skills
Registration #0236-240
Knowing when to speak, what to say, and how to say it is a prime asset for achieving success in many areas of our lives. This course focuses on techniques for communicating successfully in career, social, and personal interactions. Topics include assessing communication situations, clarifying ideas, listening, persuading, and managing conflicting viewpoints.
Credit 2

CHGL-301 Professional Presentations
Registration #0236-301
This course focuses on the principles of preparing and delivering oral presentations. Students deliver a variety of speech types representative of those commonly occurring in business, industrial, community, and social settings. Self, peer, and instructor critiquing are used for evaluation of in-class and videotaped speeches.
Credit 4

CHGL-302 Discussion Skills and Leadership
Registration #0236-302
Students study the theory of leadership in small groups and the dynamics of group behavior. The major exercises of the course are leading and participating as members in conferences which simulate those of civic, business, and industrial settings. Peer critiquing and video tapings allow students to apply theory as they learn to recognize the elements of successful conferences.
Credit 4/Qtr. (12total)

CHGL-307 Communicating in Business
Registration #0236-307
This course focuses on the development of those communication skills essential to functioning effectively in the business world. Students learn the process of analyzing communication situations and responding to them appropriately. Topics include reports, memos, letters, oral presentations, and interpersonal skills. (CHGL-205, 220 or equivalent)
Credit 4

CHGL-308 Technical Report Writing
Registration #0236-308
Students learn to prepare reports of the sort required by practicing engineers and managers in industry and business. Focus is on developing the ability to analyze audiences and purposes, state problems, design reports, and write and edit them. Assigned reports are discussed and critiqued by peers and instructor. (CHGL-205, 220 or equivalent)
Credit 4

CHGL-315 Report Writing
Registration #0236-315
Principles of organizing information into clear, concise reports; techniques for oral technical reports, letters, and memos included. (Formerly CTEF-328)
Credit 2

CHGL-323 Technical Writing and Editing
Registration #0236-323
This course focuses on the writing skills required for preparing technical documents. Adapting material and language for audience and purpose and conventions of technical writing style are emphasized. Strategies for evaluating technical discourse are studied and applied. Prior to enrolling in this course, students must demonstrate command of standard written English prose.
Credit 4

CHGL-324 Research Techniques
Registration #0236-324
This course focuses on techniques for information generation. Interviewing skills, review and use of literature, and task analysis are included.
Credit 2

CHGL-325 Instructional Design Principles
Registration #0236-325
An introduction to the process of designing instructional packages from need and task analysis through identifying goals and objectives, media selection, program development, and validation testing. (CHGL-323 and 324)
Credit 2

CHGL-326 Document Design
Registration #0236-326
An overview of the principles and techniques involved in document design. Includes basic principles of graphic design and visual communication, use of computer graphics, and introduction to typography and reproduction methods. (CHGL-323 and 324)
Credit 2

CHGL-327 Practicum: Designing Manuals
Registration #0236-327
With supervision, students apply general principles of technical communication to the process of planning, researching, writing, editing, formatting, and producing a finished manual. (CHGL-323 and 324)
Credit 2
CHGL-328 Writing for the Sciences
Registration #0236-328
This course reviews conventions used in presenting the results of scientific investigation in articles for trade journals, general news magazines, textbooks, and proceedings. Includes practice in researching, selecting, and organizing content, citing and verifying references, and preparing manuscripts. (CHGL-220 or equivalent)
Credit 2

CHGL-329 Oral Skills for Technical Communication
Registration #0236-329
This course focuses on effective techniques for oral presentation of technical material and participation, both as leader and member, in formal and informal meetings.
Credit 2

CHGL-330 Communicating Online
Registration #0236-330
Reviews recent research in online communication, presents principles for online writing and screen design, and examines systems for storage and retrieval of online information.
Credit 2

CHGL-331 Promotional Writing
Registration #0236-331
This course focuses on practical guidelines for preparing marketing materials including brochures, data sheets, trade press articles, press kits, and advertising copy. (CHGL-205, 220 or equivalent)
Credit 2

CHGL-332 Managing the Project
Registration #0236-332
Principles of project management are studied and applied in cases and examples taken from the fields of technical and public relations communication. Major topics include planning, organizing, scheduling, budgeting, controlling, monitoring, and reporting. Conflict resolution, team building, and motivation are also covered.
Credit 2

CHGL-333 Managing Media Presentations
Registration #0236-333
Introduces the processes and techniques of producing media presentations, from simple forms that can be produced in-house to more sophisticated ones that require the services of graphic designers, photographers and video production units. Students learn to evaluate the variables of schedules, resources, and costs; match media, message, and audiences; and coordinate the stages of production. (Formerly Audiovisual Presentations)
Credit 2

CHGL-334 Interpersonal Communication for Customer Service
Registration #0236-340
This course examines key dimensions of interpersonal communication, focusing on effective message styles and listening strategies to improve customer satisfaction. Techniques and actions that lead to positive outcomes such as conflict resolution, problem solving, and goal attainment are stressed. The role and importance of interpersonal skills in customer interactions and organizational policy, management and ethical issues are reviewed. Through simulation and role playing, skills are developed that may be applied to a variety of work, social and other situations.
Credit 4

CHGL-360 Introduction to Public Relations
Registration #0236-360
An overview of the public relations function, covering tasks, responsibilities and roles of the PR practitioner as researcher, image-developer, designer, editor, coordinator, marketer and advertiser; as advisor to management; and as spokesperson, media manager, and services purchaser and provider. Course may be counted as either a business or communication elective. (Consult advisor)
Credit 2

CHGL-365 Writing for the Organization I
Registration #0236-365
Course is designed for non-professional writers whose positions frequently require preparation of public relations correspondence as well as copy for inbound and outbound company publications. Emphasis is on developing clarity, precise use of language, and style in writing letters, reporting information, and creating feature articles. (CHGL-220 or equivalent)
Credit 2

CHGL-366 Writing for the Organization II
Registration #0236-366
Introduction to public relations writing at the corporate level, including planning, writing, and producing documents and publications intended to interpret the organization both internally and externally. Provides practice in writing a variety of news and feature copy, including crisis communication, covering meetings, adapting interviews for print, and statements for various media. (CHGL-365 or equivalent)
Credit 2

CHGL-367 Scripting and Speechwriting
Registration #0236-367
Principles of and practice in two specialized forms of writing often required of professional communicators: scripting and speechwriting. Scripting covers writing and production techniques for audio-visuals. Storyboarding, using basic script formats, is included. Introduction to video, including general-purpose videos and training videos, is provided, plus a primer on the video news release. Speechwriting focuses on techniques for preparing speeches in "the voice of another," adapting the message, wording, and tone. (CHGL-220 or equivalent)
Credit 4

CHGL-393 Creative Leadership Skills
Registration #0236-393
Focuses on the interpersonal and leadership skills required for administrating communication services within various work environments, such as the small consulting agency, the not-for-profit organization, or the large corporation. Includes strategies and skills for interacting with diverse groups and individuals, such as clients, media, sales and marketing personnel, providers of goods and services; and engineers, editors, writers, and upper management. Provides understanding of cultural, age, and gender issues and techniques for recruiting and retaining good performers. (CHGL-323 or 366, or equivalent)
Credit 4
CHGL-394 Supervising Communication Services
Registration #0236-394
Focuses on the practical skills required for supervising groups that provide communication services and products. Includes defining organizational/group goals, assessing and meeting the needs of clients, establishing standards and systems for quality assurance, performing basic financial functions typical of cost/profit centers, managing permanent and contract employees, and basic techniques for marketing communication services. (CHGL-323 or 366, or equivalent)
Credit 4

CHGL-395 Coordinating Publications Production
Registration #0236-395
A survey course for professional communicators. Provides an overview of major phases of print production and general understanding of the factors that must be considered in purchasing print production services: estimates, schedules, paper and binding options, colorization, print trade customs, and illustrations; and guidelines for coordinating the stages of production. (CHGL-323 or 366, or equivalent)
Credit 2

CHGL-396 Communication Seminar
Registration #0236-396
Focuses on several topics of interest to professional communicators such as communication law and ethics, investigation of technology options for facilitating communication services, and other selected issues in the communication field. Students research and present topics; guests lecturers invited. (CHGL-323 or 366 or equivalent)
Credit 2

CHGL-298,398 Special Topics: Communications
Registration #0236-298, 398
Special topics are experimental courses announced quarterly. Watch for titles in the course listing each quarter.
Credit Variable

CHGL-411 The Public Relations Campaign
Registration #0236-411
An in-depth examination of successful strategies for creating and evaluating a total public relations campaign. Through the study of case histories and hands-on experience with both actual and hypothetical situations, students gain a thorough understanding of campaign management, including: research, goal setting, publicity, advertising, community relations, direct mail, and special events. Emphasis is on use and integration of effective communication tools and techniques for achieving desired results. (CHGL-366 or equivalent)
Credit 4

CHGL-412 Communicating in Print and Broadcast Media
Registration #0236-412
Hands-on experience with various phases and styles of those communications practices essential to print and broadcast media, particularly in the news environment. Students gain experience in copywriting for newspapers, radio, and television; editing for newspapers and broadcast; publication techniques for all three media; writing for trade and specialty publications; managing internal media, such as employee newsletters and in-house TV systems; and using techniques for production and direction in video and radio. The purpose of this course is not to prepare future journalists or broadcasters, but to acquaint advertising and public relations practitioners with the activities and perceptual skills of news-gathering professionals, with whom they must successfully interact. (CHGL-366 or equivalent)
Credit 4

CHGL-413 Seminar in Public Relations: Cases and Solutions
Registration #0236-413
An integrating seminar for the certificate in advanced public relations. Seminar topics are selected from among real and hypothetical cases in the history of public relations. Cases embrace such complex problems as launching a new product, crisis management, image management, publicizing significant events, as well as responding to such major societal issues as the environment, health, and the problems of the aging. (CHGL-411 and CHGS-451 or CHGL-412, or equivalent)
Credit 4

CHGL-415 On Camera! On Mike!
Registration #0236-415
Focuses on preparation and delivery skills for effective radio and TV appearances by non-professionals serving as spokespersons for their organizations. Audio and video tapings of simulated interviews, press conferences, and panel presentations provide opportunities for student practice and for instructor and peer critiques. Also presents a framework for understanding the perspectives and functions of the broadcast media as well as guidelines for effective use of broadcast formats to achieve public relations or marketing goals. (CHGL-220 or 301, or equivalent)
Credit 4

Social Sciences

CHGS-201 Anthropology: Introduction
Registration #0237-201
Examines the similarities and differences among cultures. The course focuses particularly on the influences of environment, technology, work, authority, kin and non-kin groups, enculturation, religion, folklore, and art in different societies.
Credit 4

CHGS-211 Psychology: Introduction
Registration #0237-211
How people think, feel and interact with others comprises the central content of this course. Students learn how scientific method is used to discover some of the factors involved in sensation, perception, motivation, emotion, stress and learning. Given particular attention are: physical and personality development, psychological disorders, and social behavior. Students are encouraged to relate this information to their personal and professional lives.
Credit 4

CHGS-221 Principles of Economics I
Registration #0237-221
This course covers the basic principles of macro-economics. It traces the development of economics from a historical perspective, the functioning of the American economic system, and covers such topics as money and banking, economic growth and problems of inflation, unemployment, scarcity of resources, business cycles, international trade, and supply and demand.
Credit 4

CHGS-222 Principles of Economics II
Registration #0237-222
This course covers micro-economic problems such as distribution of income, allocation of resources, price determination under competition, monopolies, supply and demand, and their applications to business firms and labor unions. It also deals with the structure of American industry and the roles played by government, business, and individuals viewed in the light of current economic trends.
Credit 4
CHGS-223 Principles of Economics III
Registration #0237-223
A further elaboration of the elementary principles of economic analysis introduced in Principles of Economics I (macro-economics) and II (micro-economics). Particular emphasis will be placed on the application of these principles to the decision-making process of business and industry, domestically and internationally. (CHGS-221 and CHGS-222)
Credit 4

CHGS-227 The New Service Economy
Registration #0237-227
Provides an overview of the emerging national and regional service economies. Defines the service sector, both consumer and producer services, using a variety of local examples drawn from health care, information and communication, hospitality, financial and personnel services. Economic and labor force implications of the service economy are analyzed along with the structure of service organizations, service delivery systems and levels of service.
Credit 2

CHGS-231 Sociology: Foundations
Registration #0237-231
A scientific examination of human beings and their relationships with one another. Consideration is given to the role of the individual in society, social interaction, social institutions and social change. Objectives are to examine the human condition in the context of social relationships, dispel myths and prejudices, and ascertain practical applications of concepts.
Credit 4

CHGS-261 Political Science: Introduction
Registration #0237-261
Introduces the discipline of political science. It is designed to acquaint students with the complexities of political issues, political thought and behavior, government structures and processes, public policy, and international affairs.
Credit 4

CHGS-316 Psychology: Behavior in Industry
Registration #0237-316
Industry presents one environment for understanding human behavior. This course applies psychological and social concepts to the industrial setting. Topics to be covered are motivation, performance, assessment, quality of work life, group behavior, leadership, organizational structure, communication and decision making. (CHGS-211 recommended)
Credit 4

CHGS-317 Psychology of Stress and Adjustment
Registration #0237-317
Physiological, psychological, and social stress can have serious consequences on one's daily life. This course is designed to familiarize students with basic concepts, the positive and negative ramifications of stress, and strategies for stress management. (CHGS-211 or equivalent)
Credit 4

CHGS-320 Psychology of Persuasion
Registration #0237-320
Examines important research on persuasive communication, covering: What causes people to respond to persuasive communication in different ways? How can the communicator predict group responses to a given persuasive message? Projects will require students to use theory in designing effective strategies for various purposes and audiences. This course is required for the Public Relations Communications Certificate.
Credit 2

CHGS-326 Communicating Across Cultures
Registration #0237-326
Communicating across cultures is about managing differences between distinct ways of life and finding common bases for interaction. Each individual's behavior is rooted in the cultural experience of locale, region, and country. During international business travel, the individual will encounter profound cultural differences. How to decipher variations in dress, demeanor, body language, interpersonal and social behavior, and material things in business and social contexts is the subject of this course. How to apply these insights about diversity in a successful accommodation to various host countries is the primary objective of this course. This course is required in the International Business and Culture Certificate.
Credit 4

CHGS-327 International Economic Policies and Principles
Registration #0237-327
This course will assist students in preparing to work effectively in both domestic and international economic settings. Emphasis will include policies and principles associated with macroeconomic effects of trade, international monetary instruments, and the economics of major nations and regions of the world. This course is required in the International Business and Culture Certificate.
Credit 4

CHGS-331 Cultural Diversity: America's Trial and Treasure
Registration #0237-331
A course designed to inform and stimulate students' understanding of what it will mean to live and work in a society in which ethnic and cultural diversity is the norm. Students will learn the sources and risks of diversity as well as strategies for coping with the effects of their own cultural ethnocentrism and that of others. Learning activities will include media, case studies and a variety of interactive processes. This course may, in special cases, substitute for a required course in the International Business and Culture Certificate.
Credit 4

CHGS-341 Doing Business in the European Economic Community
Registration #0237-341
An overview of the evolutionary roots of the Common Market in Europe with a view of both the history of that institution and the forces that compel the EEC trends of today. The course looks at each country in the EEC and notes some of the economic and political features of the agreement and some of the issues, problems and possibilities. Included also will be a review of the changes in Eastern Europe (e.g., German reunification) and the likely effects on the European economic scene. This course is an elective for the International Business and Culture Certificate.
Credit 2
CHGS-342  
Doing Business in Germany  
Registration #0237-342  
This course is designed to give students an understanding of German society and culture in general and of German business customs, practices, and attitudes specifically. Its emphasis is on the study of the environment in which business transactions take place in Germany. This course is an elective for the International Business and Culture Certificate.  
Credit 2

CHGS-343  
Doing Business in Latin America  
Registration #0237-343  
This course is designed to give students a broad understanding of international business practices with specific emphasis on business in Latin America. Its focus is on the study of the environment in which business transactions take place in Latin America. Emphasis will be placed on Brazil, Mexico, and Argentina. This course is an elective for the International Business and Culture Certificate.  
Credit 2

CHGS-344  
Doing Business in Japan  
Registration #0237-344  
This course is intended to give students an understanding of Japanese society, customs, and culture generally, and particularly of Japanese business and management practices, for which that nation has become internationally renowned. Emphasis is on an examination of the environment in which business transactions take place, especially regarding tradition, quality, participatory responsibility in production and management, and the importance of a single ethnic and cultural source. This course is an elective for the International Business and Culture Certificate.  
Credit 2

CHGS-351  
Nuances for Women and Other Gender-Related Issues in International Business  
Registration #0237-351  
This course provides women and men with an awareness of gender-related issues in international business and practical skills that lessen culture shock and add to one's effectiveness in coping with such issues in cultures where business interaction with women is either uncommon or simply different from such interactions in the United States. Students will gain an increased awareness of gender-related issues facing both men and women, particularly the latter, as they work in the international marketplace. Students will also learn selected techniques for coping with these situations—techniques suitable for training programs, other class situations, or their own lives in business. This course is an elective for the International Business and Culture Certificate.  
Credit 2

CHGS-451  
The Mass Media in Public Relations  
Registration #0237-451  
An examination of the nature and influence of mass media in public relations activities and their importance to the professional public relations practitioner. Particular emphasis on the criteria used to assess and judge the most appropriate media for various communication purposes, including the promotion of products and services and the persuasion of various audiences. Other topics include analysis of messages; examination of the relationship of advertising, marketing, and public relations to the various media; and the need for quality and integrity in successful media representations. Incorporates a survey of the structure and development of newspapers; magazines; and the radio, recording, film, and television industries. This course is required for the Advanced Public Relations Communications Certificate. (CHGL-366 or equivalent)  
Credit 4

Science and Technology  

Mathematics  

NOTE: Entering students who apply for any of the beginning mathematics courses, CTAM-201, 210 or 251, are required to take a diagnostic examination to determine the level at which they may start the mathematics sequence. Students who have had previous college level mathematics courses should consult with an advisor.

CTAM-201,202  
Technical Mathematics  
Registration #0240-201, 202  
A two-quarter sequence introducing college algebra and trigonometry, covering basic algebraic concepts and operations, algebraic and transcendental (trigonometric, logarithmic, and exponential) functions. (Three years high school math or equivalent.) (Requires pre-test)  
Credit 4/Qtr.

CTAM-203  
Technical Calculus  
Registration #0240-203  
An elementary applied calculus course. This course covers the basic differential and integral calculus of algebraic and transcendental functions with applications. (CTAM-202 or equivalent)  
Credit 4

CTAM-205  
Mathematical Thought and Processes  
Registration #0240-205  
An examination of mathematical thought and processes through a study of elementary mathematical concepts. This course is designed to acquaint the student with the "mathematical way of thinking," the development of mathematical formulas, the applications of mathematics in today's society on an elementary level.

Credit 4

CTAM-206  
Modern Mathematical Methods  
Registration #0240-206  
An examination of selected modern mathematical methods used in today's society. This examination includes a study of the nature of these methods, a study of how these methods are used, and a study of the usefulness of these methods in today's society. (CTAM-205)

Credit 4

CTAM-210  
College Algebra and Trigonometry  
Registration #0240-210  
A pre-calculus course covering a study of algebraic and transcendental (trigonometric, logarithmic, and exponential) functions including graphs and equations. (Three years of high school mathematics or equivalent including intermediate algebra.) (Requires pre-test.)  
Credit 4
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Registration #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTAM-251</td>
<td>Calculus I</td>
<td>#0240-251</td>
<td>Topics include limits, derivatives of algebraic and trigonometric functions, continuity; differentials; related rates; curve sketching; maxima and minima problems; indeterminate forms. (CTAM-210 or equivalent.) (Requires pre-test.) Credit 4</td>
</tr>
<tr>
<td>CTAM-252</td>
<td>Calculus II</td>
<td>#0240-252</td>
<td>Topics include the indefinite integral: the definite integral; applications; differentiation and integration of transcendental functions. (CTAM-251 or equivalent) Credit 4</td>
</tr>
<tr>
<td>CTAM-253</td>
<td>Calculus III</td>
<td>#0240-253</td>
<td>Topics include methods in integration; plane analytic geometry; polar coordinates; vector algebra with emphasis on applications; sequences and series. (CTAM-252 or equivalent) Credit 4</td>
</tr>
<tr>
<td>CTAM-265</td>
<td>Discrete Mathematics I</td>
<td>#0240-265</td>
<td>An introduction to discrete mathematics with application in computer science and mathematics, with an emphasis on proof techniques. It covers the basics of combinatorics, sets, functions, the natural numbers, and the integers modulo n. (CTAM-201, 202 or equivalent) Credit 4</td>
</tr>
<tr>
<td>CTAM-266</td>
<td>Discrete Mathematics II</td>
<td>#0240-266</td>
<td>A continuation of discrete mathematics with applications in computer science and operations research. It covers finite state machines, relations, graphs, trees, optimization and matching. (CTAM-265) Credit 4</td>
</tr>
<tr>
<td>CTAM-305</td>
<td>Calculus</td>
<td>#0240-305</td>
<td>Partial differentiation; multiple integrals; solid analytic geometry; vector calculus with emphasis on applications to science and engineering. (CTAM-253 or equivalent) Credit 4</td>
</tr>
<tr>
<td>CTAM-306</td>
<td>Differential Equations</td>
<td>#0240-306</td>
<td>Ordinary differential equations through nth order with emphasis on first and second order linear. Applications, LaPlace Transforms. (CTAM-305 or equivalent) Credit 4</td>
</tr>
<tr>
<td>CTAM-318</td>
<td>Boundary Value Problems</td>
<td>#0240-318</td>
<td>A continuation of CTAM-306, Differential Equations. Topics covered are Fourier Series, and introduction to partial differential equations; series solutions of differential equations; applications of the material covered. (CTAM-306 or equivalent) Credit 4</td>
</tr>
<tr>
<td>CTAM-328</td>
<td>Engineering Mathematics</td>
<td>#0240-328</td>
<td>An introduction to matrix algebra and vector analysis. Topics covered are matrix operations with application; vector algebra, vector calculus, gradient, divergence and curl; linear and surface integrals; independence of path and the divergence theorem; applications. (CTAM-305 or equivalent) Credit 4</td>
</tr>
<tr>
<td>CTAM-341,342</td>
<td>Engineering Statistics</td>
<td>#0240-341,342</td>
<td>Designed to provide the student with a working understanding of the basic statistical strategies useful in the analysis and interpretation of data generated by problems of variation in the physical and applied sciences, and as such is a study of the concepts and techniques of mathematical probability and statistics and its role as the central core of all statistical strategies. (CTAM-305 or equivalent) Credit 4</td>
</tr>
<tr>
<td>CTAM-407</td>
<td>Linear Algebra</td>
<td>#0240-407</td>
<td>This course covers linear difference equations; numerical methods for solving equations; interpolation, iteration, and approximating procedures; error analysis or related methods; empirical formulas; and problems involving computer applications. Where applicable, the computer will be used in solving problems. (FORTRAN or BASIC Programming and CTAM-306 or equivalents) Credit 4</td>
</tr>
<tr>
<td>CTAM-417</td>
<td>Numerical Analysis</td>
<td>#0240-417</td>
<td>A study of the calculus of complex functions. Cauchy Theory leading to residue theory and conformal mapping. (CTAM-305 or equivalent) Credit 4</td>
</tr>
<tr>
<td>CTAM-420</td>
<td>Complex Variables</td>
<td>#0240-420</td>
<td>This course now offered through the College of Engineering under Registration #0301-351. Credit 4</td>
</tr>
<tr>
<td>CTBE-401</td>
<td>Circuit Analysis</td>
<td>Lec.</td>
<td>This course now offered through the College of Engineering under Registration #0301-351. Credit 4</td>
</tr>
<tr>
<td>CTBE-406</td>
<td>Strength of Materials 1</td>
<td>Lab</td>
<td>This course now offered through the College of Engineering under Registration #0304-336, 339. Credit 4</td>
</tr>
</tbody>
</table>
Chemistry

CTCC-241, 242 (Lec.)  Engineering Chemistry
CTCC-246, 247 (Lab)
Registration #0244-241,242,246,247
A general chemistry course for engineering science and applied science students. The fundamental concepts relating to the physical states of matter, the atomic theory, chemical reactions, thermodynamics, kinetics, electrochemistry, solutions, acid-base theory, oxidation-reduction reactions, nuclear chemistry and a brief introduction to organic chemistry, biochemistry and polymer chemistry as these topics relate to technological problems are presented. The emphasis is placed on the techniques available for the solution of real problems. The laboratory includes application of the principles discussed in lecture to the solution of specific or project oriented laboratory problems. (CTCP-202 or equivalent)
Credit 4/Qtr., Lec. 3, Lab 1

Physics

CTCP-201, 202, 203 (Lec.) College Physics
CTCP-206, 207, 208 (Lab)
Registration #0245-201,202,203,206,207,208
A basic course in physics using algebra and trigonometry; topics covered: statics, dynamics, harmonic motion, sound, heat, fluid-flow, wave motion, optics, electricity and magnetism. Emphasis on understanding of basic principles and problem solving. (CTAM-202. Students who have not taken CTAM-202 must take a math qualifying exam.)
Credit 4/Qtr., Lec. 3, Lab 1

CTCP-301, 302, 303 (Lec.) Physics
CTCP-306, 307, 308 (Lab)
Registration #0245-301,302,303,306,307,308
Physics for engineering and science students. The following topics are covered: statics, dynamics, harmonic motion, sound, heat, fluid-flow, wave motion, sound, thermodynamics, fluid-flow, optics, electricity and magnetism. Calculus is used freely. (CTAM-253 or equivalent)
Credit 5/Qtr., Lec. 4, Lab 1

CTCP-457 Modern Physics
Registration #0245-457
An introductory course of 20th century physics. Review of some classical concepts, special relativity, quantum effects, duality of waves and particles, the hydrogen atom. (CTCP-303, CTAM-305)
Credit 4

CTCP-458 Modern Physics
Registration #0245-458
A continuation of CTCP-457. Many electron atoms, molecular physics, solid state physics and devices. (CTCP-457 or equivalent)
Credit 4

CTCP-459 Nuclear Physics
Registration #0245-459
Elementary particles, nuclear structure, nuclear reactions, fission, fusion. Nuclear power, accelerating machines. (CTCP-457 or equivalent)
Credit 4

Contemporary Science

CTCS-221 Contemporary Science: Biology
Registration #0246-221
An introduction to the fundamental principles of biology for nonscience majors and the application of these concepts to areas of interest in our contemporary technological society. Topics to be discussed include the cell as a biological unit, the biogenesis-abiogenesis controversy, genetic coding and introduction to plant and animal biology. The course is presented in a lecture-demonstration format. (CTAM-201 or CTAM-205 or CBCH-201 or equivalent)
Credit 4

CTCS-222 Contemporary Science: Chemistry
Registration #0246-222
An introduction to the fundamental principles of chemistry for nonscience majors and the application of those concepts to areas of interest and concern in our contemporary technological society. Topics to be discussed include the atomic theory, chemical periodicity, nuclear reactions and energy, physical states of matter, chemical compounds, chemical reactions, organic chemistry, biological chemistry and macromolecular chemistry. The course is presented in lecture-demonstration format. (CTAM-201 or CTAM-205 or CBCH-201 or equivalent)
Credit 4

CTCS-223 Contemporary Science: Physics
Registration #0246-223
An introduction to the fundamental principles of physics for nonscience 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. The course is presented in a lecture-demonstration format. (CTAM-201 or CTAM-205 or CBCH-201 or equivalent)
Credit 4

CTCS-224 Contemporary Science: Oceanus
Registration #0246-224
An introduction to the fundamental principles of oceanography for nonscience majors, and the application of those concepts to areas of interest and concern in our contemporary technological society. The marine environment will be investigated in terms of basic scientific concepts, and topics to be discussed will include plate tectonics and earthquake prediction, the impact of ocean pollutants, climate fluctuations, cetacean intelligence and resources from the sea. (A Telecourse offering)
Credit 4

CTCS-289 Contemporary Science: Mechanical Universe
Registration #0246-289
This course is an introduction to physics for nonscience majors that uses the video course, "The Mechanical Universe...and Beyond," as the main method for presentation of material. The topics covered include: units and dimensional analysis, motion, force, energy, heat, waves, light, relativity, atoms and quantum mechanics. A Telecourse offering. (CTAM-201 or CBCH-201)
Credit 4
**Computer Programming**

**CTDP-215 FORTRAN Programming**
Registration #0249-215
A study of FORTRAN programming techniques and applications. Topics include FORTRAN constants, variables, expressions, functions, logical operations, storage allocations, statements. I/O manipulation and subprograms. Debugging and diagnostic methods. Programming projects will be required. (ICSA-200 or permission of advisor)
Credit 4

**CTDP-320 Computer Programming for Engineers**
Registration #0249-320
This course now offered through the College of Engineering under Registration #0301-240.

**CTDP-330 PL/1 Programming**
Registration #0249-330
Topics include elementary data types and control structures, data structuring capabilities (arrays and records), run-time error handling, standard built-in functions, text processing, user written functions and subroutines. Emphasis on developing well-structured and modular programs. Programming projects are required. (A high level programming language)
Credit 4

**CTDP-488 Programming Systems Workshop**
Registration #0249-488
A workshop for the mastery of the techniques and concepts of programming systems, design and implementation. Students will work with data modeling, both with and without a data-base management system product. Students will gain experience with system specification and design charting techniques, project scheduling and management and programming team experience. Programming projects will be required. (Consult department for prerequisite)
Credit 4

**Computer Systems**

**CTDS-200 Introduction to Computers and Programming**
Registration #0250-200
Basic concepts and overview of computer science. The topics include historical development, algorithms, flowcharting and programming in BASIC. Exposure to hardware concepts, software concepts, binary and hex numbers and logic. Application of the computer to various disciplines. Not for computer science majors. (High school intermediate algebra)(Also a Telecourse offering)
Credit 4

**CTDS-201 Applications Software**
Registration #0250-201
An introduction to several types of applications software. The lectures and hands-on experience labs are oriented to the IBM PC. Major subjects covered will include: hardware components; disk storage; disk operating system (DOS); word processing (WORDSTAR or WORDPERFECT); spreadsheeting (LOTUS 1-2-3); and data base management (DBASE III). A course for persons involved in information management. (CTDS-200)
Credit 4

**CTDS-203 Advanced Topics in Application Software**
Registration #0250-203
This is a continuation of CTDS-201 and prepares students for more in-depth interaction with their PCs and the applications software. Major topics include: MS-DOS, Print Graph and programming with macros in Lotus, custom screen layouts and query language in DBASE III+. (CTDS-201)
Credit 4

**CTDS-340 Finite State Machines and Automata**
Registration #0250-340
Topics include finite state models, machine capabilities, descriptive methods, decomposition methods, regular expressions, bilateral analysis and synthesis, sequential iterative systems and space-time transformations. (Consult department for prerequisite)
Credit 4

**CTDS-400 Logical Design**
Registration #0250-400
An introduction to switching theory, sequential circuit analysis and synthesis, error detection, error correction networks, speed-up techniques, serial and parallel approaches, interfacing techniques. (Consult department for prerequisite)
Credit 4

**CTDS-430 Numerical Methods**
Registration #0250-430
Topics included are: error analysis, roots of an equation, solution of systems of equations, interpolation, power series calculation of functions, numerical integration and first order differential equations. Programming projects are required. (SMAT-421 or equivalent and FORTRAN or BASIC)
Credit 4

**CTDS-440 Operating Systems**
Registration #0250-440
A general survey of operating system concepts. Topics include process synchronization, interprocess communication, deadlocks, resource management, memory management, overlays, static and dynamic relocation, virtual memory, file systems, logical and physical I/O, device allocation, process and resource protection. (Consult department for prerequisite)
Credit 4

**CTDS-480 Formal Languages**
Registration #0250-480
Formal language theory and principles. Topics include context free, context sensitive grammars, regular expressions; Turing machines; introduction to computability. (CTDS-340)
Credit 4

**CTDS-520 Computer Architecture**
Registration #0250-520
A study of computer architecture and design. Topics include review of basic theories, hardware technology, parallel and distributive logic, synchronous and asynchronous machines and analysis of commercial machines. Alternatives to classical machine structure. (Consult department for prerequisite)
Credit 4
Machine Shop

NOTE: All courses must be taken in the proper sequence in each program. For additional information call department, 475-5021.

CTIS-101,102,103  Precision Measurement
Registration #0266-101,102,103
The care and use of all common inspection and gauging equipment. Techniques of inspecting various types of parts, quality control procedures and discussion and application on the use of tolerancing; blueprints and true positioning. Sine bar, contour projector, casting layout, surface finishes, thread gauging, common types of production gaging and the use of optical flats are used in the second and third quarters.
Credit 1/Qtr.

CTIS-104 to CTIS-109  Advanced Machine Shop I, II
Registration #0266-104,105,106,107,108,109
Advanced work on lathes, milling machines and grinders; explanations and demonstrations of more difficult problems; assemblies and temporary tooling. Some work done entirely in metrics. Must accurately handle tool room layout, machining, and measuring equipment. Special emphasis on skill, neatness and accuracy. (CTIS-203)
Credit 1/Qtr.
CTIS-281  Computer Numerical Control (Mill)
Registration #0266-281
This course is designed to offer the student the fundamentals and techniques in computer numerical control. Point-to-point and contour programming, linear and circular interpolation, looping and macros. Special canned cycles are introduced and used along with the hands-on experience. (Phase I Machine Shop diploma or equivalent)
Credit 3

CTIS-282  Computer Numerical Control (Lathe)
Registration #0266-282
Code System and format as used by industry for writing programs in contour, linear and circular interpolation along with safe and efficient tooling techniques. Canned turning, facing, drilling and threading cycles will be covered with compensation for tooling radius. Bar feed programming along with straight and taper threading. Will include hands-on. (Phase I Machine Shop diploma programs or approval of machine shop counselor)
Credit 3

CTIS-283  Computer-Aided Manufacturing
Registration #0266-283
Course emphasizing computer-aided manufacturing (CAM) for numerically controlled machine tools. Automatic fabrication of parts utilizing programs developed for a computer system will be stressed. Part programming output consisting of original input information, necessary information for post-processors for various machine tools with graphical output of optimum cutter path. CAM is introduced utilizing the SmartCAM computer-aided system. (CTIS-281 or 282 or programming experience)
Credit 3

Emergency Management

CEMP-201  Earth Sciences for the Emergency Manager
Registration #0285-201
Introduction to applied meteorology and crustal dynamics. The meteorological topics include basic atmospheric parameters, air mass theory, weather maps, generation and effects of severe weather, atmospheric stability, and the simple Gaussian model of plume transport. The crustal dynamics segment includes a qualitative treatment of plate tectonics and faults with emphasis on earthquake generation, the Richter scales, damage from earthquakes, and the state of the art of earthquake prediction.
Credit 4

CEMP-202  Man-Made Hazards
Registration #0285-202
Survey of the chemistry of hazardous materials, including toxics, caustics, flammables, and reectives. Industrial storage and transportation practices; effects of exposure on humans; protective measures. Introduction to the physics of radiation. Radioisotopes in common use; methods of storage and transportation. Effects of exposure on humans; protective actions. Design of commercial power reactors and safety features.
Credit 4

CEMP-301  Emergency Management Laws and Regulations
Registration #0285-301
An introduction to the principal statutes, regulations, and court cases governing emergency preparedness in New York State. The chief topics are NYS Executive Law (Article 2-B), Title III, of the Superfund Amendment and Reauthorization Act of 1986, NuReg-0654 governing radiological accident preparedness, federal and state disaster aid statutes, and the principles of NYS liability law as they apply to disaster clean-up. (CEMP-201 or 202)
Credit 4

CEMP-302  Emergency Planning and Methodology
Registration #0285-302
Quantitative methods of risk and hazard analysis; the scope of a comprehensive emergency plan; classes of protective actions; evacuations; turf problems associated with multi-agency plans; command structures; the post-incident recovery phase; the design of exercises; the role of new technologies in disaster response. Students will prepare hazard analyses and write sections of comprehensive plans for actual communities. (CEMP-201,202, 301)
Credit 4

CEMP-330  Health, Safety, and Security Abroad
Registration #0285-330
A non-culture-specific survey of personal health and safety issues abroad. The anatomy of international terrorism is discussed, including major groups in Europe, Africa, and the Middle East; their tactics; and protective measures to be taken by targets and general public, with special emphasis on travel. Kidnapping and hostage behavior are discussed. Criminal activity is discussed in the context of types of generalized social structures that may be encountered abroad. Finally, health issues are discussed, including common health hazards, features of selected overseas health care systems, insurance, and extra protective measures that should be taken in underdeveloped areas.
Credit 2

CEMP-381  Emergency Operations
Registration #0285-381
Classroom study of the roles of fire, police, emergency medical services, and volunteer agencies like the Red Cross at various types of major disasters; how to set up on-scene command posts and off-site operations centers; the Incident Command System; role of the media; how to critique incidents. Students will gain familiarity with on-scene command responsibilities through role plays on an incident simulator. (CEMP-201, 202, 301; CEMP-302 may be taken concurrently)
Credit 4

School of Professional Studies

Environmental Management (Solid Waste)

CEMS-200  Environmental Management (Solid Waste) Seminar
Registration #0286-200
A course required of all entering students describing the EM (SW) academic program and expectations and the nature of the field.
Credit 1

CEMS-201  Principles of Municipal Solid Waste Systems
Registration #0286-201
Introduction to municipal solid waste systems. The topics include an overview of the relationship of municipal solid waste, environmental protection, protection of public health, and public service; solid waste generation and natural resources; and the unit operations of municipal solid waste collection, transfer, resource recovery, and disposal.
Credit 4
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
<th>Registration #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEMS-301</td>
<td>Solid Waste Management I: Recycling</td>
<td>4</td>
<td>#0286-301</td>
<td>A survey of recycling technology and its relationship to the general problem of municipal solid waste management. Explores both the mechanics and the economics of the problem. Topics include the separation and collection of recyclable materials, recycling as a manufacturing process, the development of markets, and public education issues. (CEMS-201)</td>
</tr>
<tr>
<td>CEMS-311</td>
<td>Solid Waste Management II: Reduction</td>
<td>4</td>
<td>#0286-311</td>
<td>A study of the techniques and strategies being developed and used to reduce the generation of waste in both public and private sectors. Examines methods of reducing waste toxicity and quantity and of increasing the recyclability of waste materials. (CEMS-301)</td>
</tr>
<tr>
<td>CEMS-321</td>
<td>Solid Waste Management III: Land Applications</td>
<td>4</td>
<td>#0286-321</td>
<td>A survey of the technological factors in siting, designing, and operating modern landfills and composting facilities. Topics to be discussed include the dynamic processes occurring in landfills and composting sites, site selection, facility design and operation, special operational needs, and the closure of landfills and end uses for the sites. (CEMS-311)</td>
</tr>
<tr>
<td>CEMS-331</td>
<td>Solid Waste Management IV: Energy Recovery &amp; Material Conversion</td>
<td>4</td>
<td>#0286-331</td>
<td>A survey of solid waste energy recovery and material conversion technologies. Course will examine MSW as a feedstock for the production of energy and material products. Topics include mechanical, thermal, chemical, and biological processes and conversions. (CEMS-321)</td>
</tr>
<tr>
<td>CEMS-360</td>
<td>Environmental Chemistry and Microbiology</td>
<td>3</td>
<td>#0286-360</td>
<td>A survey of the techniques used for sampling and laboratory analysis of soil and water, and of environmental microbiology with emphasis on the role of microorganisms in solid waste management. Chemistry topics include a review of chemicals of environmental concern, the design of a sampling program, and quality control in sampling and analysis. The microbiology topics include the biology of micro-organisms of concern in solid waste and their practical application in solid waste treatment and disposal. (SCHG-201, 202, SCHG-221, 222, SBIB-201, 205)</td>
</tr>
<tr>
<td>CEMS-362</td>
<td>Environmental Chemistry and Microbiology Laboratory</td>
<td>1</td>
<td>#0286-362</td>
<td>Laboratory to accompany CEMS-360, Environmental Chemistry and Microbiology. (Credit or coregistration in CEMS-360)</td>
</tr>
<tr>
<td>CEMS-370</td>
<td>Geology for Environmental Management</td>
<td>4</td>
<td>#0286-370</td>
<td>A survey of the aspects of geology of greatest use to solid waste managers. Topics include an overview of geology; its relationship to solid waste management issues and regulatory considerations; and a discussion of minerals, rocks, soils, geologic structures, subsurface waters, rock weathering, frost action in soils, historical geology, geologic maps and sections, aerial photographic interpretation of soils, soil mechanics, subsurface exploration, rock and soil chemistry, and soils and sanitary landfills. (SPSP-211, 212, SPSP-271, 272)</td>
</tr>
<tr>
<td>CEMS-380</td>
<td>Hydrology for Environmental Management</td>
<td>4</td>
<td>#0286-380</td>
<td>A survey of environmental hydrology with emphasis on the surface and groundwater factors related to solid waste collection, storage, treatment, and disposal. Topics include an introduction to the hydrologic cycle, a discussion of weather and hydrology, precipitation, stream flow, evaporation and transpiration, groundwater, and surface water runoff. (CEMS-370)</td>
</tr>
<tr>
<td>CEMS-442</td>
<td>Environmental Regulatory Law</td>
<td>4</td>
<td>#0286-442</td>
<td>A survey of budgeting and finance, including revenue sources, the budgetary process, and budget management. Particular attention is given to the capital budget process and methods of capital financing for both general government purposes and enterprise fund activities. (GSSE-301, 302, GSSM-455)</td>
</tr>
<tr>
<td>CEMS-475</td>
<td>Special &amp; Hazardous Wastes</td>
<td>4</td>
<td>#0286-475</td>
<td>A survey of the techniques and strategies used to manage hazardous wastes, non-hazardous industrial wastes, infectious wastes, and other problematic materials that enter municipal solid waste systems. (CEMS-331, 360, 362)</td>
</tr>
<tr>
<td>CEMS-480</td>
<td>Environmental Regulatory Law</td>
<td>4</td>
<td>#0286-480</td>
<td>An overview of environmental law and regulations pertaining to solid waste management at the federal and state levels, with emphasis on New York State. Topics include the federal Resource Conservation and Recovery Act, especially Subtitle D; state environmental statutes and regulations for solid waste management; environmental impact assessments; state environmental policy laws; and the New York State regulatory process for solid waste management facilities. (CEMS-201)</td>
</tr>
<tr>
<td>CEMS-510</td>
<td>Integrated Solid Waste Management Seminar</td>
<td>4</td>
<td>#0286-510</td>
<td>This seminar integrates knowledge gained in previous courses, presents special topics not covered elsewhere, such as emerging solid waste technologies, and prepares the student for the project paper to be written in CEMS-511. (Open only to fifth-year EM (SW) majors)</td>
</tr>
</tbody>
</table>
CEMS-511 Senior Project Paper
Registration #0286-511
This course consists of independent work demonstrating the ability to solve a significant solid waste management problem in a comprehensive fashion. The problem will focus on future or emerging technologies as well as current techniques. (CEMS-510)
Credit 4

Technology Marketing and Distribution
CTMD-209 TM&D First-Year Seminar
Registration #0287-209
Required of all students entering the Technology Marketing & Distribution concentration. Course broadly describes the field of industrial distribution, career prospects, and the academic requirements of the program. Team building will be stressed with group projects. (Open only to TM&D students)
Credit 2

CTMD-555 Industrial Structure and Technology
Registration #0287-555
This is a capstone course required of all students in TM&D. Guest lecturers and faculty will present contemporary overviews of the industry and projections of future trends in industries in which manufacturers' representatives play a vital role. Students will be required to write a major paper on a selected field of technology, describing its manufacturing structure, key technologies, marketing dynamics, and future trends. (Open only to fifth-year TM&D students)
Credit 4

Learning Development Center-Technical
TLDT-010 Basic Mathematics
Registration #1710-010
This is a complete course of instruction designed to develop the student's ability to perform arithmetic computations. Topics covered will include whole numbers, fractions, decimals, percent, geometric measures, and ratios. Additional topics might include reading of graphs and charts. Interspersed throughout the course will be discussions on "math anxiety" and techniques for studying mathematics.
Credit 0

TLDT-011 Introductory Algebra
Registration #1710-011
This course starts with a quick review of arithmetic and geometry and then introduces topics from algebra. These topics include signed numbers, order of operations, polynomials, linear equations, inequalities, word problems, and factoring.
Credit 0

TLDT-012 Intermediate Algebra
Registration # 1710-012
This course is a continuation of Introductory Algebra and will begin with topics in factoring and algebraic fractions. Also included are graphing linear equations, working with systems of equations, exponents, and scientific notation.
Credit 0

TLDT-013 Intermediate Algebra & Trigonometry
Registration #1710-013
The first part of this course is a continuation of Intermediate Algebra and will include the study of radicals, complex numbers, and the solution of quadratic equations. Other topics included will be logarithms and logarithmic and exponential equations. The last part of the course will cover topics in trigonometry, including the solutions of right and oblique triangles and the graphs of trig functions.
Credit 0

TLDT-051 Shop Mathematics
Registration #1710-051
Elements of computational mathematics designed to increase analytical ability to solve complicated shop problems. This course includes fractions, decimals, percents, conversion to the metric system, tolerances, use of calculator, area, and volume. Additional application problems such as tapers included as time permits.
Credit 0

TLDT-052 Shop Algebra
Registration #1710-052
Elements of algebra with applications in shop problems. Topics included are algebraic operations, solutions of equations, rearrangement of formulas, ratio, and proportion. Applications are in gears and pulleys, speeds and feeds, and gears.
Credit 0

TLDT-053 Shop Geometry
Registration #1710-053
Elements of geometry with applications in shop problems. Topics included are lines, points, planes, angles, triangles, polygons, circles, and the Pythagorean theorem. Applications are learned through constructions. Additional material in compound angles is included if time permits.
Credit 0

TLDT-054 Shop Trigonometry
Registration #1710-054
Elements of basic trigonometry with applications in shop mathematics. Topics included are the six basic trigonometric functions, simple applications, machine diagrams, law of sines and cosines, and numerical control (both incremental and absolute).
Credit 0
College of Engineering

Undeclared Engineering

Required Courses

EENG-210 Introduction to Engineering
Registration #0302-210
This one-credit course is designed for the undeclared engineering student. The main objective is to present information and exercises to introduce the student to the five engineering curricula offered by RIT. Various aspects of the curricula requirements, as well as career opportunities that are available, will be discussed as they pertain to each major.

Class 2, Credit 1 (F)

Computer Engineering

Required Courses

EECC-200 Introduction to Computer Engineering
Registration #0306-200
The purpose of this course is to briefly describe the field of computer engineering and to provide a frame of reference for the sequences of computer engineering, computer science, and electrical engineering courses that appear in the computer engineering curriculum. Topics will include an introduction to computers and computing, basic concepts, nomenclature, historical background, and some elements of data representation.

Class 1, Credit 1 (F)

EECC-250 Assembly Language Programming for Computer Engineers
Registration #0306-250
An introduction to the fundamental organization, assembly language programming, and input/output techniques of a modern microprocessor system. This course will cover addressing methods, machine instructions, assembler directives, macro definitions, relocatability, subroutine linkage, data-structures, I/O programming, exception processing, and interrupts. The assembly language program design techniques necessary to write efficient, maintainable modules that emphasize communication with parallel and serial I/O devices will be considered. The Motorola MC68000 microprocessor family of devices will be used in most class examples and all required programming projects. (ICSP-242 or equivalent)

Class 4, Credit 4 (S, SR)

EECC-341 Introduction to Digital Systems for Computer Engineers
Registration #0306-341
The course covers the specification, analysis, and design of digital systems. The rapid growth of digital computers, control devices, instruments, and communication equipment requires a basic knowledge and general methodology that can be adapted to rapidly evolving changes and constraints. The study of combinatorial and sequential systems will consider the use of standard modules such as decoders, encoders, multiplexers, shifters, ROMs, PLAs, adders, registers, and counters. The laboratory will provide more insight into the physical and circuit aspects of the design and implementation of digital systems using commercial state-of-the-art SSI, MSI, and LSI components. (SMAM-265 concurrently)

Class 3, Lab 3, Credit 4 (W)

EECC-361 Modeling of Linear Systems
Registration #0306-361
This course provides an introduction to mathematical modeling of linear systems. Time domain models: homogeneous first- and second-order systems, simultaneous systems and linear algebra method of solution, nonhomogeneous systems. Frequency-domain models: systems functions, Laplace and Fourier transforms and inverse transform. Overview of digital simulation. Mechanical and electrical systems will be studied; assignments will make use of Advanced Continuous Simulation Language (ACSL). (SMAM-306)

Class 4, Credit 4 (S)

EECC-452 Linear Control Systems
Registration #0306-452
This course provides a comprehensive introduction to the essential theories and techniques for the analysis and design of continuous linear systems. The modeling and control of dynamic systems will be studied using the frequency domain approach and the state space approach. Students will be required to verify their linear control system design projects using computer simulation techniques. (IEEEE-352, SMAM-306, EECC-361)

Class 4, Credit 4 (S, SR)

EECC-550 Computer Organization
Registration #0306-550
This course provides the understanding of the information transfer and transformations which occur in a computer with emphasis on the relations between computer architecture and organization. Topics to include: design levels and their respective primitives; modules and descriptive media; register transfer and microoperations; basic computer organization and design; central processor organization; control unit and microprogramming; memory organization; input-output organization; computer architecture—defining the hardware/software interface; and from architecture to organization (one to many). (EECC-341, ICSS-440)

Class 4, Credit 4 (S, SR)

EECC-551 Computer Architecture
Registration #0306-551
This course provides the critical tools to quantitatively analyze uniprocessor computer performance. Instruction set architecture alternatives are described, and examples are presented of each alternative, such as load-and-store, CISC, stack, etc. Techniques to enhance performance, such as pipelining, cache memory, and memory hierarchy, are presented. The use of vector processing, such as is used in supercomputers, is described and analyzed. Finally, the impact of input/output on computer performance is described.

Class 4, Credit 4 (F, W)

EECC-553 Digital Control Systems Design
Registration #0306-553
This course deals with the design of linear control systems using signals that are sampled in time and quantized in amplitude. The classical transform methods are first described and then applied to illustrative design examples. This course will focus on the topics of the modern state space approach for designing control systems directly in the discrete time domain. Laboratory projects on the analysis and design of microprocessor-based digital control systems will be assigned. (EECC-452; EECC-560 concurrently)

Class 3, Lab 3, Credit 4 (F, W)


**EECC-560** Interface and Digital Electronics
Registration #0306-560

Introduction to some common transducers, transformations from raw measured quantity to transducer output. Instrumentation amplifiers, active filters, analog switching for applications in multiplexors, and sample and hold circuits. The analog-to-digital and digital-to-analog conversions processes. Logic families including TTL, ECL, MOS, and their interfaces to each other. (Fourth-year status in Computer Engineering)

Class 3, Lab 3, Credit 4 (F, W)

**EECC-694** Data and Computer Communications
Registration #0306-694

This course provides a unified view of the broad field of data and computer communications. Emphasis will be on the basic principles underlying the technology of data and computer communications. Critical issues in data communication networks as well as the current and evolving standards in computer communication architecture will be discussed. The topology, access control, and performance of various types of local area networks will be studied in detail. (Fifth-year standing in Computer Engineering or permission of instructor)

Class 4, Credit 4 (S)

**Technical Electives**

**EECC-620** Design Automation of Digital Systems
Registration #0306-620

Design automation deals with the use of computers as a tool or aid in the design and manufacturing of digital systems. Topics covered will include systematic methods for digital design; the VHDL hardware description language; simulation techniques at system level, register-transfer level, and logic element level; partitioning of digital systems; placement; routing; and design rule checking. (EECC-550 or ICS-520, or ICS-720)

Class 4, Credit 4 (F, W)

**EECC-631** Advanced VLSI Design
Registration #0306-631

A second course in the design and implementation of Very Large Scale Integration (VLSI) circuits and systems. Emphasis will be placed on the design and use of dynamic precharge and precharge-evaluate CMOS circuitry, including Domino, NORA, and Zipper CMOS logic. Basic requirements of a clocking system and a general clocking strategy for timing design in both static and dynamic CMOS circuits will be investigated. Topics on the design and use of a standard cell library in the implementation of large system designs will be covered. The use of workstations with Mentor Graphics Corporation design tools will be required in laboratory projects leading to the design, fabrication, and testing of an integrated circuit device.

Class 4, Credit 4 (W, S)

**EECC-683** Document Image Processing
Registration #0306-683

This course is suitable for both undergraduate and graduate students interested in document image processing. Several topics will be covered in the field, including input scanning, output printing, and image processing. Interpolation techniques for scaling and resolution conversion will be discussed. Rotation, edge extraction, halftoning, and compression of digital images will be covered. Feature extraction and recognition of image characters will be described. The course will provide a framework for showing the relationships among these various topics in electronic document processing.

Class 4, Credit 4 (S)

**EECC-699** Independent Study
Registration #0306-699

The purpose of this course is to allow senior-level undergraduate and first-year graduate 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 by the department head. (Permission of the supervising faculty member and the department head required.)

Credit variable: 1 to 4 quarter credits

**EECC-660** Interface and Digital Electronics
Registration #0306-660

This course covers the specification, analysis, design, and implementation of digital systems. The hierarchical and structured design methodology is introduced. Both synchronous and asynchronous sequential machines are studied. It covers the MS/LSI modules, PALs, and EPROMs and their use in design. Design for testability is emphasized. (EECC-341, EECC-560)

Class 3, Credit 3 (F, SR)

**EECC-650** Projects in Computer Engineering
Registration #0306-650

Several detailed projects involving the design of hardware and software will be posed to exercise the students' engineering design creativity and ability to integrate concepts from throughout the curriculum. Some lectures will be presented on real time programming techniques such as interrupt handlers, multitasking concepts, process synchronization, response time considerations, input noise reduction, and debugging techniques. Other topics will also be presented. (Fifth-year standing in Computer Engineering)

Class 3, Lab 3, Credit 4 (F, W)

**EECC-672** Special Topics in Computer Engineering
Registration #0306-672

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 normal format; that is, regularly scheduled class sessions with an instructor. The level of complexity is commensurate with a senior level undergraduate/first year graduate technical course.

Class 4, Credit 4
EECC-720  Electronic Design Automation
Class 4, Credit 4 (W, S)
Registration #0306-720
The creation of large complex electronic systems has grown beyond the capabilities of people without computer support; successful completion of large design projects requires that computers be used in virtually all aspects. This course will investigate some basic design automation tools and algorithms in order to understand their capabilities, limitations, and internal operations. Topics covered will be the VHDL hardware description language, simulation techniques, design synthesis, placement and routing, and design verification methods. Laboratory projects in the use and creation of design automation tools will be required. (EECC-561 or equivalent; EECC-630, 730 suggested)
Class 4, Credit 4

EECC-722  Advanced Computer Architecture
Class 4, Credit 4 (W)
Registration #0306-722
This course will emphasize the impact of VLSI and communication issues on computer architecture. Topics covered will include highly concurrent, multiprocessor and fault-tolerant computer systems as well as data flow architectures. Modeling techniques for system verification will also be included. (EECC-551 or ICSS-720)
Class 4, Credit 4 (W)

EECC-730  VLSI Design Projects
Class 4, Credit 4 (F, S, SR)
Registration #0306-730
An introduction to the design and implementation of Very Large Scale Integration, or VLSI, including NMOS and PMOS devices, CMOS circuits, and digital subsystems. The procedures for designing and implementing digital integrated systems will be covered, including the Mead and Conway structured design approach consisting of the use of stick diagramming, scaling of NMOS and CMOS design rules, and techniques for estimating time delays. Emphasis will be placed on the use of static CMOS circuits and regular structures such as programmed logic arrays in custom and standard cell-based designs. The use of workstations with Mentor Graphics Corporation design tools for circuit simulation and for the design of circuit layouts will be stressed. Laboratory design projects will be required.

EECC-731  VLSI Design
Class 4, Credit 4 (W, S)
Registration #0306-731
A second course in the design and implementation of Very Large Scale Integration (VLSI) circuits and systems. Emphasis will be placed on the design and use of dynamic precharge and precharge-evaluate CMOS circuitry, including Domino, NORA, and Zipper CMOS logic. Basic requirements of a clocking system and a general clocking strategy for timing design in both static and dynamic CMOS circuits will be investigated. Topics on the design and use of a standard cell library in the implementation of large system designs will be covered. The use of workstations with Mentor Graphics Corporation design tools will be required in laboratory projects leading to the design, fabrication, and testing of an integrated circuit device.

EECC-740  Design for Testability
Class 4, Credit 4 (F)
Registration #0306-740
This course begins by reviewing signal and system analysis techniques for analyzing linear systems. It includes Fourier techniques and moves on to present fundamental computational techniques appropriate for a number of applications areas of computer engineering. A section on numerical linear algebra will include techniques for analyzing discrete time signals and systems. Other major course areas are symbolic logic and discrete optimization techniques, including computer representations of networks, shortest-path problems and minimum spanning tree problems. (ICSA-705 or equivalent)
Class 4, Credit 4 (F)

EECC-741  Fault-Tolerant Systems
Class 4, Credit 4 (S)
Registration #0306-741
This course will introduce the concepts of failure mechanisms and fault modeling in digital circuits. It describes various test strategies for the digital systems. Techniques to integrate design and test for VLSI circuits will be included. Design for autonomous test, SCAN-PATH concepts, and testability analysis will be discussed. Built-in-self test (BIST) techniques will be detailed. Concepts of easily testable logic will be introduced. In addition, testability bus and the boundary-scan techniques will be included for system-level testability.
Credit 4 (F)

EECC-756  Fault-Tolerant Digital Systems
Class 4, Credit 4 (S)
Registration #0306-756
This course will cover the general guidelines, methodology, and approaches for the design, development, and use of single and multi, micro or minicomputer systems. The 16-bit and 32-bit microprocessors have vast address spaces and virtual memory capability, incorporate complex I/O facilities, and permit rapid execution of cost-saving, high-level languages. The hardware and software support available for these microprocessors also makes them a cost-effective alternative to minicomputers. Distributed systems based on microcomputer technology will be investigated with emphasis on interconnect structures, intercommunications, software and hardware. The course will include a laboratory workshop in which each student will be required to design, implement, and test one or more parts of a practical system. Emphasis will be placed on engineering ability and management skill to meet proposed technical goals on time and within budget. (Graduate standing in Computer Engineering with at least three core courses completed or permission of instructor)
Class 4, Credit 4 (S)

EECC-758  Digital Interfacing Principles
Class 4, Credit 4 (F)
Registration #0306-758
The objective of this course is to give graduate students basic concepts of interfacing to microcomputer bus systems, including familiarity with various peripheral components currently available. Students will gain experience in the actual implementation of microcomputer systems. The course is hardware oriented, but some high-level language software will be required to make the experimental systems operational.
Class 3, Lab 3, Credit 4 (F)
This course introduces students to the basic components used in digital systems. It is taken with an end object of hardware implementation on a VAX system. A traditional approach to the design of state machines is discussed, followed by analysis and filtering techniques. Segmentation, projection, and reconstruction techniques are discussed. Finally, bi-level image processing is discussed, including contour filling and thinning techniques. Programming projects will be required. (Competence in calculus, engineering math and structured programming is required.)

Class 4, Credit 4 (no regular course schedule)

EECC-890 Thesis
Registration #0306-890
An independent engineering project or research problem to demonstrate professional maturity. A formal written thesis and an oral defense are required. The student must obtain the approval of an appropriate faculty member to guide the thesis before registering for the thesis. Thesis credit may be accumulated to earn the 5 credits required for the MS degree.

Credit variable

Electrical Engineering

EEE-203 Electrical Engineering Freshman Seminar
Registration #0301-203
This course is designed to give the entering first-year student an overview of electrical engineering and to help integrate the incoming student into the RIT EE community. Topics to be discussed include the electrical engineering course of study at RIT, the cooperative work experience, an overview of RIT facilities, and career options in electrical engineering. In addition this course will give the student an opportunity to interact with EE faculty, upper division students, and other first-year EE students.

Credit 1 (F)

EEE-240 Introduction to Digital Systems
Registration #0301-240
This course introduces students to the basic components used in digital systems. It is also usually the student's first exposure to engineering design. Mixed logic is taught as a design tool for combinational logic. The flip-flop, and its combination into engineering design. Thevenin, Norton, and maximum power transfer theorems are proved and applied. Inductance and capacitance are introduced, and the response of RL and RC circuits to step inputs is established. In preparation for the study of electronics, the ideal operational amplifier is discussed and basic inverting and non-inverting amplifier circuits are analyzed. (SPSP-313 or equivalent)

Class 3, Lab 2, Credit 4 (W, S, Ext. day F)

EEE-310 Numerical Methods
Registration #0301-310
This course introduces the student to the potential of the digital computer for solving engineering problems. In addition, it is designed to further hone the student's skill in the proper use of the C programming language. Algorithmic topics include solving linear, nonlinear and transcendental equations; solving systems of linear equations; interpolation and numerical differentiation; numerical integration; curve fitting and data smoothing using the method of least squares; and systems of ordinary differential equations. Advanced topics in the course will include an introduction to data structures and to techniques for handling and operating on large arrays of data. The course will also introduce the student to the use of application software such as MatLab for the solution of engineering problems. (EEE-345 or equivalent)

Class 3, Credit 3 (W, Ext. day S)

EEE-330 Seminar in C Programming
Registration #0301-330
This course introduces the C programming language to those who already have learned some other language (Fortran, Pascal). It will introduce the standard C variable types, operators, expressions, control structures, and standard C input/output. Comparisons will be made with Fortran throughout these topics. Additional C topics, including pointers and arrays and file input/output, will also be presented. The student will be introduced to the C preprocessor and to the use of header files. Weekly programming exercises will be used to augment classwork. Students will be encouraged to work either on the RIT VAX system or on personal computers.

Class 2, Credit 1 (F, W, S, Ext. day W)

EEE-345 C Programming for Engineers
Registration #0301-345
Introduction to computer programming using the C programming language on the RIT VAX system and on personal computers. The course includes an introduction to good programming practices, such as top-down planning, structured programming, modularity, debug strategies, and a strong emphasis on program clarity and documentation. Flow charting will be covered, and programming models will include straight line, branching, and looping programs. Students will be introduced to C data types, variables, operators, expressions, and standard C control structures. C functions will be studied thoroughly, and the student will learn additional C features such as pointers, arrays, structures, and unions. Throughout the course the student will do a wide variety of computer programming exercises, all of which will be chosen from real engineering problems that the student will see in future courses. In addition, application programs such as plotting routines and mathematical libraries will be introduced.

Class 4, Credit 4 (F, S, SR, Ext. day W)

EEE-351 Circuit Analysis I
Registration #0301-351
Covers the fundamentals of DC circuit analysis, starting with the definition of voltage, current, resistance, power, and energy. Linearity and superposition, together with Kirchoff's Laws, are applied to the analysis of circuits having series, parallel, and other combinations of elements. Circuits with both dependent and independent voltage and current sources are studied. These concepts are generalized into branch, loop, mesh, and nodal analysis. Thevenin, Norton, and maximum power transfer theorems are proved and applied. Inductance and capacitance are introduced, and the response of RL and RC circuits to step inputs is established. In preparation for the study of electronics, the ideal operational amplifier is discussed and basic inverting and non-inverting amplifier circuits are analyzed. (SPSP-313 or equivalent)

Class 4, Credit 4 (F, S, SR, Ext. day S)
EEE-352  Circuit Analysis II  Registration #0301-352
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, and three-phase systems are analyzed. Two-port network theory is developed and applied to circuits and interconnections. Basic magnetics is introduced, and the analysis of mutual induction as applied to coupled coils and linear and ideal transformers, in conjunction with RLC circuits, is pursued. Simple filters are studied via transfer functions, plotting amplitude, and phase diagrams and are extended to cover the phenomenon of resonance. (EEE-351)

Class 3, Credit 3 (F, W, Ext. day F)

EEE-364  Digital Circuits and Microprocessors  Registration #0301-364
This course is intended for non-majors. The goal of the course is to provide an overview of digital logic and microcomputers. Concepts such as number systems and Boolean algebra are introduced. Digital design concepts concentrating on SSI and MSI circuits are discussed. Students learn about sequential circuits and memory elements along with arithmetic circuits. All of these elements build to microprocessor hardware concepts and software skills at the machine and assembly language level.

Class 4, Lab 2, Credit 4 (W, S, SR)

EEE-365  Introduction to Microcomputers  Registration #0301-365
Introductory course on microcomputers. Begins with computer architecture, including detailed discussion of the memory unit and the central processing unit, its registers, and their functions. This is followed by a study of computer arithmetic, logic operations, number systems, and codes. Computer programming is introduced at the machine assembly language levels with emphasis on computer instruction sets and addressing modes. Flow charts for straight line, branching, and looping programs are studied. Effective programming techniques are compared. Concepts of input/output are studied in detail. Emphasis is placed on program-controlled I/O. The course includes extensive hands-on exercises. Finally, microcomputer testing concepts are introduced.

Class 4, Lab 2, Credit 4 (W, S, Ext. day W)

EEE-380  Electrical Engineering Lab I  Registration #0301-380
This laboratory course has been designed to accompany the lectures of EEEE-351 (Circuits I). It will introduce the student to the use of the oscilloscope and other common laboratory instruments. It is also designed to introduce the student to the use of engineering workstations in the design process for both analog and digital electronic circuits. (EEE-240; corequisite EEEE-351).

Credit 1 (F, S, SR, Ext. day S)

EEE-390  Electrical Engineering Lab II  Registration #0301-390
This laboratory course has been designed to accompany the lectures of both EEEE-352 (Circuits II) and EEEE-441 (Electronics I). It will continue exposure of students to common laboratory instruments and to the structure of electronic design. The use of the engineering workstations in the design process is emphasized. The design, simulation, construction, and evaluation of a single-stage electronic amplifier is required. (EEE-380; corequisite EEEE-441).

Credit 1 (F, W, Ext. day S)

EEE-395  Electrical Engineering Lab III  Registration #0301-395
This laboratory course has been designed to accompany the lectures of both EEEE-453 (Linear Systems I) and EEEE-442 (Electronics II). It continues the integration of the engineering workstation into the electronic design program. The design, simulation, construction, and evaluation of a multistage amplifier is required. The evaluation will include DC operating points, transient response, and steady-state frequency response. (EEE-390; corequisite EEEE-442).

Credit 1 (S, SR, Ext. day F)

EEE-441  Electronics I  Registration #0301-441
Introduction to electronics and the basic principles of small signal analysis of circuits with non-linear components. The course covers the use of ideal operational amplifiers in non-linear applications such as comparators and circuits with hysteresis. The PN junction is introduced, followed by a study of basic junction and field-effect transistor function. The course is primarily concerned with such fundamental semiconductor devices as circuit elements, dwelling principally on diode applications and simple BJT and FET transistor amplifier stages. Study includes rectification and power supply filtering and the basic operation and biasing of bipolar and junction field effect transistors. Analytical techniques include the development of linear-equivalent circuits, load line construction, small signal analysis of single amplifier stages, and waveform prediction. Emphasis is on developing skills required for circuit design. (EEE-351)

Class 3, Credit 3 (F, W, Ext. day S)

EEE-442  Electronics II  Registration #0301-442
Continuation of EEEE-441. Primarily concerned with analog electronics, the course covers cascaded amplifiers and the design of IC operational amplifiers (including differential amplifiers, active loads, current mirror and level shifting circuits) as well as more advanced op amp subjects such as offsets and component mismatching; NMOS, PMOS, and CMOS circuits and basic analog/digital interfacing; amplifier frequency response, Bode diagrams, multivibrators, and power amplifiers; effect of feedback on circuit performance; the study of feedback amplifier design; and means of determining open and closed loop behavior. (EEE-352, 441)

Class 3, Credit 3 (S, SR, Ext. day F)
EEE-453 Linear Systems I
Registration #0301-453
(Continuous)
This course provides the foundations of signal and system analysis, including signal and system description and modeling. Topics covered include input-output relationship of a linear system; convolution; Fourier series; evaluation of Fourier coefficients; circuit analysis with periodic inputs; exponential and trigonometric forms of Fourier series and their properties, relationships, and applications. Fourier transforms including energy spectrum and energy spectral density (along with applications) are covered. A comprehensive treatment of the Laplace transform and its inverse; concepts of transfer function, poles, and zeros; frequency response of systems and Bode diagrams; application of Laplace transforms to system modeling; solution of differential equations; and circuit analysis are also taught. (EEE-352, SMAM-306, SMAM-420)
Class 4, Credit 4 (S, SR, Ext. day F)

EEE-455 Linear Systems for Microelectronics
Registration #0301-455
This course is intended primarily for microelectronics students as an introduction to signal and system analysis. Topics include exponential and trigonometric forms of Fourier series and their properties, Fourier transforms, and elements of linear systems. Spatial signals and applications of transform theory to optical systems are also covered. (The course cannot be used by EE majors as a substitute for EEEE-453.) (SMAM-306, EEEE-352)
Class 4, Credit 4 (S, SR)

EEE-471 Electromagnetic Fields I
Registration #0301-471
The primary objective is to study electrostatic and magnetostatic fields and the physical laws that govern their behavior. At the same time, analytical techniques are developed that serve as a good foundation for solving electromagnetic problems. The following topics are discussed: review of vector algebra, vector calculus and the orthogonal coordinate systems—cartesian, cylindrical, and spherical coordinates; electrostatic fields—Coulomb's law, Gauss's law, the electric potential, conductors, and dielectrics in static electric fields, polarization, electric flux density and dielectric constant, boundary conditions, capacitance, electrostatic energy and forces; solution of electrostatic problems—Poisson's and Laplace's equations, method of images; steady electric currents, conduction current density and resistance; static magnetic fields—Ampere's law, the vector magnetic potential, Biot-Savart's law, the magnetic dipole, magnetization, magnetic field intensity, permeability, boundary conditions, self and mutual inductance, magnetic energy and forces. (SMAM-324)
Class 4, Credit 4 (S, SR, Ext. day S)

EEE-472 Electromagnetic Fields II
Registration #0301-472
The primary objective is to study the propagation, reflection, and transmission of electromagnetic waves in unbounded regions and in guiding structures such as two-conductor transmission lines and rectangular waveguides. The following topics are discussed: Faraday's law of electromagnetic induction; time varying fields and Maxwell's equations, boundary conditions, and the wave equations; uniform plane waves in free space and in conductive regions; polarization—linear, circular, and elliptical; the Poynting theorem and electromagnetic power; wave reflection, and transmission at normal incidence from plane boundaries—multiple dielectric interfaces, the complex reflection coefficient, and wave impedance; oblique incidence at plane dielectric boundaries—perpendicular and parallel polarization; TE and TM waves in rectangular waveguides—propagation and dispersion characteristics, attenuation losses, power transmission. The laboratory portion of the course discusses the theory of two-conductor transmission lines—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. A few experiments are conducted to illustrate fundamental wave propagation and reflection concepts. (EEE-471)
Class 4, Lab 2, Credit 4 (F, W, Ext. day F)

EEE-513 Introduction to Automatic Control
Registration #0301-513
This is a first course in the study of linear control systems and their physical behavior, including stability and transient response. This is approached through the classical methods of the Laplace domain. Topics include transfer function models of physical systems, signal flow graph, transient and stability analysis of closed loop systems using classical techniques of root locus, and Bode diagrams. Design of feedback systems, lag and lead compensators, designs using root locus, and frequency response techniques. Students are expected to use computer-aided design packages (ACSL, CTRL-C, etc.) in both class assignments and in the laboratory projects. (EEE-554)
Class 3, Lab 3, Credit 4 (S, SR, Ext. day F)

EEE-521 Introduction to Photonics
Registration #0301-521
A course that introduces application of the principles and practices of modern optics to problems in information processing and transmission systems. Topics include a review of electromagnetic wave propagation, geometric optics, optical polarization, interference and diffraction, Fourier optics, and a discussion of topics from contemporary optics. (EEE-453, 472)
Class 4, Credit 4 (S, SR)

EEE-531 Electromechanical Energy Conversion
Registration #0301-531
This course provides an introduction to transformer systems and AC and DC machines. Basic relationships for power and energy in rotating systems, magnetic fields, and electrical circuits are developed into an understanding of the operational characteristics of electrical machines. (EEE-352)
Class 3, Lab 3, Credit 4 (F, W, Ext. day S)
Introduction to Communication Systems

This course 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 FSK and PSK. Noise effects. Optimum detection: matched filters, maximum-likelihood reception. Computer simulation. (SMAM-351, EEEE-453)

Class 4, Credit 4 (S, SR, Ext. day W)

Semiconductor Electronics

The objective of this course is to teach students the physical mechanisms that govern operation of the most widely used semiconductor devices. Topics include semiconductor fundamentals, pn junction diodes, bipolar and field-effect transistors, and metal-oxide semiconductor capacitors. The course emphasizes the relationships between the physical and structural parameters of these devices and their electrical performance. (EEEE-442)

Class 4, Credit 4 (F, W, Ext. day W)

Digital Electronics

The objective of this course is to study the principles of digital electronic circuits with emphasis on MOS (CMOS in particular) and their use in logic circuits. It is expected to serve as a prerequisite for digital systems design and VLSI design. Topics include review of basic logic principles, study of MOS devices and their models, basic logic structures using MOS devices, circuit characterization and performance estimation, design structures of logic systems, memory, registers and system timing, practical realities and ground rules, and bipolar digital circuits. The laboratory portion of the course will introduce the student to fabrication of integrated circuits, simulation of digital circuits, and design of basic logic circuits using workstations and software packages. (EEEE-240, 544)

Class 3, Lab 3, Credit 4 (S, SR, Ext. day S)

Linear Systems II (Discrete)

Topics covered include continuation of the linear systems concepts from EEEE-453, except that in this course they are applied to discrete signals and systems. The origins of discrete sequences and systems; an introduction to sampling of continuous signals and the sampling theorem; a description of discrete systems via difference equations and convolution; the z transform and inverse z transform; system transfer function; system frequency response function and interpretation of frequency response; an introduction to the design of digital filters; filter block diagrams for FIR and IIR filters; the discrete Fourier transform, its properties and its application to the solution of signal processing problems; and a brief introduction to fast algorithms for computation of the discrete Fourier transform are discussed. (EEEE-453)

Class 4, Credit 4 (F, W, Ext. day W)
Class 3, Lab 2, Credit 4 (F, W, S)

The primary objective is to study the theory and design of microwave components and circuits. The course begins with a review of basic EM theory, TEM waves in transmission lines, and TE and TM waves in rectangular waveguides. The following are discussed in this course: microstriplines and striplines; TE and TM waves in cylindrical waveguides; waveguide tees, directional couplers, and phase shifters; microwave integrated circuit components—branchline couplers, power dividers, hybrid ring couplers, and phase shifters; rectangular, cylindrical, and coaxial cavity resonators; waveguide and coaxial line filters, and waveguide frequency meters; microwave integrated circuit high pass and band pass filters; ferrite components such as the isolator and the circulator. The laboratory portion of the course illustrates the various microwave component design and microwave measurement techniques using state-of-the-art equipment. Also required is a design project on the design of a microwave component. (EEEE-472)

Class 3, Lab 3, Credit 4 (W)

Antenna Design

This is a design course in antennas. The primary objective is to study the fundamental principles of antenna theory and apply them to the analysis and design of antennas. Emphasis will be on the design procedures for some practical and popular antenna configurations, e.g., the dipole; thin linear antennas; linear arrays—broadside and endfire and phased arrays; non-uniform amplitude linear arrays—the binomial array and the Dolf Tschebyscheff array; planar arrays; the Yagi-Uda array; E-plane and H-plane sectoral horns; the pyramidal horn; the parabolic reflector; and microstrip antennas. The student will also be exposed to the measurement techniques of antenna characteristics such as radiation pattern, gain, and input impedance using state-of-the-art equipment. The primary part of the course is a design project involving the design, construction, and testing of an antenna. The project will require a report and a presentation with a demonstration. (EEEE-472)

Class 3, Lab 3, Credit 4 (F, SR)

Design of Digital Systems

This course deals with the design of both synchronous and asynchronous digital systems. The accent is on design methodologies for final implementation on programmable logic devices. Design techniques are based on top-down design using ASM charts and bubble diagrams along with microprogramming applications. Design strategies for testability are discussed along with their impact on performance. The practical aspects of component interconnection (crosstalk, noise, transmission line effects) with effects on performance are also surveyed. The laboratory portion of the course consists of two distinct projects proposed, designed, implemented, and tested by the student. The design laboratory is supported by the SUN4 workstations and the VALID design software. (EEEE-240, EEEE-365)

Class 3, Lab 2, Credit 4 (F, W, S)
EEE-672 Optical Devices and Systems
Registration #0301-672
This is an introductory course in applied optics. Course objectives are: review fundamentals of geometrical and physical optics, including lenses, interference, diffraction; introduce devices employed in modern engineering optics such as lasers, detectors, holograms, acousto-optic and electro-optic devices; and apply optical techniques and concepts to the acquisition and transfer of information as defined by the traditional areas of communications and signal processing. The laboratory component of the course includes experiments selected from the following topics: lenses and Fourier transform optics, optical heterodyning, holography, electro-optic effect, Gaussian beams, photodetectors. (EEE-472 concurrently)
Class 3, Lab 3, Credit 4 (F, W)

EEE-674 Fiber Optics: Theory and Applications
Registration #0301-674
This is an introductory course in fiber optics. The course begins with a review of communication systems and lightwave fundamentals. This is followed by the study of dielectric waveguides and optical fibers, light emitting diodes (leds), laser diodes, and photodetectors (pin and a.p.d). The course concludes with a discussion of optical fiber communication systems with special attention to noise sources in optical receivers, bit error rate, and power budget. The laboratory component of the course includes experiments selected from the following topics: handling and cleaving fiber, numerical aperture, attenuation in optical fiber, coupling light into fiber, single and multimode fiber, laser diode characteristics, properties of photodetectors. (EEE-472)
Class 3, Lab 3, Credit 4 (S)

EEE-677 Digital Filters and Signal Processing
Registration #0301-677
A continuation of the topics studied in EEEE-554. Topics include: study of the design methods for digital IIR filters via s-plane transformations; study of design methods for digital FIR filters, including emphasis on the question of linear phase response; a review of the discrete Fourier transform (DFT) and an in-depth study of fast algorithms (FFTs) for implementing the DFT, including radix 2, radix 4, and mixed radix algorithms; quantization effects in discrete systems; an introduction to digital signal processing computer chips and their use in the implementation of digital processing systems; and applications of digital signal processing, including speech processing and two-dimensional image processing. Course includes several design projects in the digital signal processing laboratory. (EEE-554)
Class 4, Credit 4 (F, W)

EEE-679 Analog Filter Design
Registration #0301-679
The objective of this course is to study various techniques for the design of filters to meet given specifications. Approximations to the ideal filter characteristic through Butterworth, Chebyshev, and other polynomials are discussed in detail. The emphasis is on active network realizations using op amp stages. Topics include review of analysis of op amp circuits and transfer functions of networks; magnitude and frequency scaling; ideal filter characteristics; Butterworth, Chebyshev, and Bessel-Thompson approximations to the ideal filters; determination of transfer functions to meet given specifications; high-pass to low-pass and band-pass to low-pass transformations; standard op amp circuits for filter realizations; negative impedance converters; generalized impedance converters; and switched capacitor filters. (EEE-453)
Class 4, Credit 4 (W)

EEE-692 Communication Networks
Registration #0301-692
A major portion of today's communication takes place over digital networks. This includes communication between people in the form of voice, facsimile (FAX), and e-mail and communication between machines. Digital networks are most likely to be the dominant element of communication links of the future. The current effort in ISDN points to such a trend. This course will cover key aspects of the structure of present-day digital communication networks. (EEE-534)
Class 4, Credit 4 (S)

EEE-693 Digital Data Communications
Registration #0301-693
A course on the principles and practices of modern data communication systems. Topics include pulse code transmission and error probabilities, M-ary signaling and performance, RF communications link budget analysis, an introduction to channel coding, a discussion of modulation/coding tradeoffs, and a discussion of digital telephony. (EEE-534)
Class 4, Credit 4 (W, S)

EEE-694 Information Theory and Coding
Registration #0301-694
The course introduces the student to the notions of information, source entropy, and mutual information leading to the topics of efficient source coding and communication channel capacity. Huffman coding and its variations are discussed in detail. The effects of random channel disturbances are described, leading to the requirements for error-detection and error-protection coding. Linear block coding concepts are introduced, followed by a description of cyclic codes and their underlying algebraic structure. Other related topics include BCH codes, convolutional codes, and maximum-likelihood decoding of convolutional codes. (SMAM-351, EEEE-453, 534)
Class 4, Credit 4 (S)

EEE-699 Senior Design Project
Registration #0301-699
A design project is undertaken by the student either individually or as a member of a design team. Well-written documentation in the form of a project report is required. Projects that are interdisciplinary in nature are especially encouraged, and in such cases dual advisors are provided. Permission of the faculty advisor is necessary for registration. (Fifth-year standing)
Class 4, Credit 4 (F, W, S)

Industrial and Manufacturing Engineering

The following courses are required of Industrial Engineering students and are offered at least once a year.

EIEI-201 Introduction to Industrial Engineering
An introductory course in industrial engineering for first-year students. The course describes engineering in an overall sense and industrial engineering in particular. It includes an overview of some of the engineering sciences used in industrial engineering, including general principles of problem solving and approximations, the SI system, engineering graphics, engineering economy, statistics, ergonomics, and engineering design. The laboratory portion of the course covers principles of technical sketching, introduction to computer applications in terms of word processing, spreadsheets, CAD, etc., and group exercises in creative problem solving in the context of engineering design.
Class 3, Lab 1, Credit 4 (F)
EIEI-202  Computing for Industrial Engineering
Registration #0303-202
A first course in computer programming for engineers and, in particular, industrial engineers. The course involves extensive development of programming skills required in the engineering disciplines.
Class 4, Credit 4 (W)

EIEI-301  Computer Tools for Increased Productivity
Registration #0303-301
This course is designed to introduce students to personal computers and expose them to the range of computer software tools and packages that are available on IBM PCs. Students will learn how to use software to improve their productivity in all the courses that follow. (EIEI-202 or consent of instructor)
Class 2, Credit 2 (W)

EIEI-401  Introduction to Operations Research I
Registration #0303-401
An introduction to the methodology of mathematical problem formulation. Investigation of mathematical programming techniques including linear programming and special types of linear programming problems such as the transportation and assignment algorithms. (SMAM-328 or permission of instructor)
Class 4, Credit 4 (F)

EIEI-402  Introduction to Operations Research II
Registration #0303-402
A survey of elementary mathematical models within the field of systems and industrial engineering. Areas of study include queuing theory, network analysis, and inventory theory. (SMAM-351, SMAM-306 or permission of instructor)
Class 4, Credit 4 (F)

EIEI-415,516  Human Factors I, II
Registration #0303-415,516
A two-course sequence in human factors/ergonomics with emphasis on industrial ergonomics as applied to the design of workplaces, procedures, processes, and products. The first course focuses on physiological/biomechanical and anthropometric issues relating to human information processing. Both courses are taught from a systems perspective to give the engineering student an appreciation of the capabilities and limits of human performance in the context of a task-operator-machine environment system. Topics include significant problems such as repetitive motion and materials handling injuries and the design of work systems that not only comply with OSHA requirements but are also productive. (SMAM-352 or permission of instructor)
Class 3, Lab 2, Credit 4 (F-516, S-415)

EIEI-420  Work Measurement and Analysis I
Registration #0303-420
An introductory course to familiarize students with various analytical tools needed to evaluate and improve worker performance. Topics include methods of measuring and analyzing work (e.g., operations process charts, flow analysis, motion analysis, etc.), human capabilities, various techniques for generating time standards (time study, MOST, etc.), and design of workstations. (Permission of instructor)
Class 3, Lab 2, Credit 4 (F)

EIEI-422  Systems & Facilities Planning
Registration #0303-422
A basic course in plant layout. Topics include product-quantity analysis, flow of materials, relationship charts, activity charts, material handling systems design, and factors influencing the layout design. The course introduces computer-aided drafting tools as well as state-of-the-art computer-aided layout design packages. (EIEI-401 or permission of instructor)
Class 3, Lab 2, Credit 4 (S)

EIEI-481  Management Theory and Practice
Registration #0303-481
Development of the fundamental principles of the industrial enterprise. Internal organization as well as general economic conditions are considered. Emphasis is placed on the role of behavior science. (Permission of instructor)
Class 4, Credit 4 (S)

EIEI-503  Simulation
Registration #0303-503
A first course in simulation emphasizing the role of the computer in developing simulation models. The SLAM simulation language is emphasized. (EIEI-202, SMAM-351 or equivalent)
Class 4, Credit 4 (F)

EIEI-510,511  Applied Statistics I, II
Registration #0303-510,511
An applied approach to statistics utilizing theoretical tools acquired in other math-stat courses. Heavy emphasis on understanding and applying statistical analysis methods in real-world situations in engineering. Topics include quality control, reliability, analysis of variance, and regression. (SMAM-351, 352)
Class 4, Credit 4 (F-510, S-511)

EIEI-520  Engineering Economics
Registration #0303-520
Time value of money, methods of comparing alternatives, depreciation and depletion, income tax consideration, replacement, retirement and obsolescence, and capital budgeting. (SMAM-351 or permission of instructor)
Class 4, Credit 4 (F)

EIEI-530  Engineering Design
Registration #0303-530
An introduction to engineering design as it relates to unstructured problems in terms of objectives, constraints, criteria, resources, solution ideation, and multi-criteria-weighted analysis method. Topics include an overview of value analysis/value engineering and design strategies. Case studies are used, and students will participate in group design exercises. This course serves as a lead-in to EIEI-560 Project Design. (Fourth-year status)
Class 4, Credit 4 (S)

EIEI-560  Project Design
Registration #0303-560
A design course oriented to the solution of on-site industrial engineering problems. Each student group will attempt to define, analyze, design, and implement a solution to actual ongoing problems in the Rochester community. (Permission of instructor)
Class 4, Credit 4 (S)
EIEI-630 Computer-Aided Registration #0303-630 Manufacturing
To familiarize students in industrial engineering with the basic concepts and techniques needed to specify, design, and implement systems that are computer controlled. Emphasis is on real-time data acquisition and process control as related to computer-aided manufacturing. Physical simulations relate to real-world systems such as automated storage and retrieval systems, material handling systems, flexible manufacturing systems using robots. Topics include real-time programming, interface electronics, and microprocessor-based data acquisition systems and programmable controllers. (EIEI-503, permission of instructor)
Class 3, Lab 3, Credit 4 (S)

The following courses may be used as professional electives within industrial engineering and are offered subject to sufficient demand. You should consult with your advisor for advice on professional electives outside of the industrial engineering discipline.

EIEI-450 Registration #0303-450 Applied Human Factors Design of Experiments
An applied approach to the problem of how one goes about running a study or experiment in human factors. (EIEI-511 or permission of instructor)
Class 4, Credit 4

EIEI-482 Production Control I Registration #0303-482
A basic course in production control emphasizing the systems approach. Topics covered include forecasting, mathematic inventory models, material requirements planning and scheduling including PERT. (EIEI-511 and EIEI-503, or permission of instructor)
Class 4, Credit 4

EIEI-483 Production Control II Registration #0303-483
A design course in production control. Each student is asked to design, test, and implement a complete production control system for an operating plant. (EIEI-482)
Class 4, Credit 4

EIEI-504 Introduction to Operations Research III Registration #0303-504
A course intended to provide an integrated view of advanced programming techniques and their applications to industrial problems. Selected topics may include a working knowledge of advanced operations research software. (EIEI-401, 402 or permission of instructor)
Class 4, Credit 4

EIEI-505 Simulation Modeling Techniques Registration #0303-505
This course is intended to increase simulation modeling skills primarily in the areas of network and discrete event simulations. Emphasis will be placed on methods of model construction, design of simulation experiments, model validation and output data analysis. Student will utilize these techniques to analyze the performance of production systems. (EIEI-503, SMAM-352 or permission of instructor)
Class 4, Credit 4

EIEI-512 Reliability Registration #0303-512
This course deals with concepts and techniques of analysis useful in measuring systems reliability. Topics include probability distributions, component reliability, system reliability, and reliability models. Emphasis will be placed on failure data analysis model development. Students will utilize the techniques to study reliability, availability, and maintainability of systems. (EIEI-510, 511, or permission of instructor)
Class 4, Credit 4

EIEI-540 Introduction to Operations Research IV Registration #0303-540
An introduction to some advanced topics in operations research and industrial engineering. Areas of study may include game theory, Markov chains and their applications, decision analysis, network analysis. (Fifth-year I. E. standing or permission of instructor)
Class 4, Credit 4

EIEI-545 Mathematical Techniques of Systems Engineering Registration #0303-545
Laplace, Fourier and Z transforms; transform methods for solving differential, difference and differential-difference equations; feedback networks; classical optimization techniques; search techniques; theory of graphs. (Fifth-year I. E. standing or permission of instructor)
Class 4, Credit 4

EIEI-550 Safety Engineering Registration #0303-550
To acquaint student with practical aspects of safety engineering. Students will acquire a working knowledge of legal and technical aspects of safety. Recent developments in this area will be stressed, such as OSHA, Consumer Product Safety Commission, and the NIOSH Workplace Guidelines. Students will also be exposed to research methodology and ways of evaluating safety programs and related research. Reference sources will be outlined.
Class 4, Credit 4

EIEI-599 Independent Study Registration #0303-599
A supervised investigation within an industrial engineering area of student interest. (Permission of instructor)
Class variable, Credit variable

EIEI-625 Concepts in Manufacturing Registration #0303-625
An introductory course in computer-aided manufacturing. Topics include computer-aided design, group technology, process planning, adaptive control, programmable automation, numerical control, computer control, robotics, and computer-integrated manufacturing. (Permission of instructor)
Class 4, Credit 4
### EMEM-203 Freshman Seminar

Registration #0304-203

This course is designed to give the entering first-year student an overview of mechanical engineering and to help integrate the incoming student into the RIT community. Topics to be discussed include the program of study, the cooperative work experience, an overview of the RIT facilities, and career options in mechanical engineering. In addition this course will give the student an opportunity to interact with the faculty, upper division students, and other first-year students.

Credit 1 (F)

### EMEM-211 Introduction to Graphics

Registration #0304-211

The freshman course is designed to introduce the student to engineering in general and also to develop fundamental skills in engineering graphics communications. The course is intended for students with little or no engineering drawing. Students with experience in high school or the equivalent may take a qualifying examination for an exemption from this course. The course work conforms to ANSI standards.

Class 2, Lab 2, Credit 3 (F, W)

### EMEM-311 Computer Aided Design

Registration #0304-311

This one-quarter course teaches design drafting that concentrates on: computer graphic drawing techniques; geometric dimensioning and tolerancing; and production piece part and assembly drawing requirements. The last portion of the course is devoted to a project. The student learns to convert functional requirements to production drawing callouts. The course includes instruction in isometric sketching of part applications. (EMEM-211)

Class 2, Lab 2, Credit 3 (W, S)

### EMEM-331 Mechanics I

Registration #0304-331

This course is intended for students majoring in electrical and industrial engineering. Statics: equilibrium, the principle of transmissibility of forces, couples, centroids, trusses, frames, machines and friction. Introduction to strength of materials: axial stresses and strains, statically indeterminate problems, thin-walled pressure vessels, direct shear, torsion, and bending. (Prerequisite: SPSP-311; corequisite: SMAM-305)

Class 4, Credit 4 (F, W)

### EMEM-332 Mechanics II

Registration #0304-332

This course is meant for students majoring in industrial engineering. Topics include dynamics of particles and rigid bodies with an introduction to mechanical vibrations, kinematics and kinetics of particles and rigid bodies, work, energy, impulse momentum, and vibrations. Emphasis is on problem solving. (EMEM-331)

Class 4, Credit 4 (S)

### EMEM-335 Elements of Statics

Registration #0304-335

This two-credit-hour course is intended as an introduction to the principles of statics for non-mechanical engineering students with a view to providing adequate background for a subsequent course in dynamics. This basic course treats the equilibrium of particles and rigid bodies under the action of forces. Topics include forces, couples, equilibrium, and friction. (Prerequisite: SPSP-311; co-requisite: SMAM-253)

Class 2, Credit 2 (W)

### EMEM-336 Statics

Registration #0304-336

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 covered include concepts of force and moment, trusses, frames, machines, shear force and bending moment diagrams and equations, friction, fluid statics, centroids and moments of inertia. (Prerequisite: SPSP-311 and SMAM-252; corequisite: SMAM-253 and SMAM-305)

Class 4, Credit 4 (F, W)

### EMEM-342 Introduction to FORTRAN Programming

Registration #0304-342

This course introduces the students to the fundamentals of programming through the learning of the FORTRAN language. Topics covered include structured programming techniques using sequential IF-THEN-ELSE and DO WHILE structures. Various forms of the input/output are learned including formatted I/O and END-OF-FILE detection. Techniques include the use of function and subroutine subprograms that use adjustable, multidimension-al arrays. The course includes an introduction to word processing and spreadsheets.

Class 3, Credit 3 (W, S)

### EMEM-343 Materials Processing

Registration #0304-343

This course involves a study of the application of machine tools and fabrication processes to engineering materials in the manufacture of products. Topics covered include cutting processes, casting, forming, powder metallurgy, welding, and processing of plastics. Students make a project in the lab portion of the course.

Class 3, Lab 2, Credit 4 (F, W)

### EMEM-344 Materials Science

Registration #0304-344

This course deals with the structure and properties of metallic, organic, and ceramic materials as related to structural imperfections, atom movements, and phase changes. The intent of the course is to develop a basic understanding of the structure/properties relationship in materials and their behavior in service environments. (SCHG-208)

Class 3, Lab 2, Credit 4 (W, S)
This is a basic course in the fundamental principles of the mechanics of deformable media including stress, strain, deflections, and the relationships between them. The basic loadings of tension, compression, shear, torsion, and bending are also included. Engineering Mechanics Lab (EMEM-348) is to be taken concurrently with this course. (EMEM-336)

Class 4, Credit 4 (W, S)

EMEM-348 Engineering Mechanics Laboratory

A required laboratory course taken concurrently with EMEM-347. It illustrates the mechanical behavior of common engineering materials. Students investigate a material's response to axial, torsional, and bending loads. In addition, students are introduced to statistical analysis of data, basic experimental techniques, strain gage mounting and usage, and effective report writing. (EMEM-336; corequisite EMEM-347)

Lab 2, Credit 1 (W, S)

EMEM-349 Elements of Dynamics

This is a basic course for non-mechanical engineering students in the fundamentals of dynamics of particles and rigid bodies. Topics include kinematics and kinetics of particles and rigid bodies, work, energy, and momentum. (EMEM-331 or EMEM-335)

Class 3, Credit 3 (W, S)

EMEM-359 Dynamics

This is 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 and the theorems of work-energy and impulse-momentum are also applied to a variety of rigid body problems. (EMEM-336)

Class 5, Credit 5 (S)

EMEM-410 Three-Dimensional Computer-Aided Design

This is an elective course which introduces students to three-dimensional computer-aided design using graphics workstations. Topics include design file creation and manipulation, element construction and manipulation, levels, text placement, cells, graphic groups and working sets, and dimensioning. A student completing this course becomes an experienced system user and qualified for related co-op work and/or further study of the interactive analysis software packages. (EMEM-311)

Class 1, Lab 2, Credit 2 (F, W)

EMEM-413 Thermodynamics

This is 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. (SMAM-252, EMEM-336)

Class 4, Credit 4 (F, W)
EMEM-440 Numerical Methods
Registration #0304-440
This course involves a study of the numerical methods for modelling and solving engineering problems using computers and interpreting and analyzing the numerical results obtained. Topics include roots of algebraic and transcendental equations, solutions of homogeneous and non-homogeneous systems of linear algebraic equations, numerical integration and differentiation, and ordinary differential equations. Applications will be taken from the student's background in statics, strength of materials, dynamics, mathematics, and thermodynamics. Students are expected to write a number of programs. (EMEM-342 or equivalent computer experience, SMAM-318, and third-year standing)
Class 4, Credit 4 (F, W)

EMEM-464 Design for Manufacture
Registration #0304-464
In this course the student learns how to design parts for economical manufacture and how to design assemblies with the optimum number of parts. It is a project-based course and includes lectures on the creative process. The course uses both manual and software techniques to calculate assembly design efficiencies and software techniques to determine part and part tooling costs. (EMEM-311, EMEM-343)
Class 4, Credit 4 (S, SR)

EMEM-514 Heat Transfer I
Registration #0304-514
This is a basic course in the fundamentals of heat transfer by conduction, convection, and radiation, together with applications to typical engineering systems. Topics covered include one-dimensional steady state and transient heat conduction, radiation between black bodies and gray bodies, correlations for the Nusselt number in forced and natural convection, and an introduction to heat exchanger design by LMTD and NTU methods (EMEM-413, EMEM-415)
Class 4, Credit 4 (F, W)

EMEM-518 Advanced Computational Techniques
Registration #0304-518
The theoretical base obtained in Numerical Methods, EMEM-440, is extended to discrete analysis. The course covers finite element and finite difference techniques and their applications in mechanical engineering (structural analysis, heat transfer, fluid mechanics). (EMEM-440)
Class 3, Lab 2, Credit 4 (S, SR)

EMEM-543 System Dynamics
Registration #0304-543
This required course introduces the student to systems modeling, analysis, and design. Lumped-parameter mechanical, electrical, electromechanical, acoustic, and thermal systems are considered. The determination and solution of differential equations that model system behavior is a vital aspect of the course. System response is characterized in both time and frequency domains. The design of systems or sub-systems is evaluated based on performance criteria, and design modifications are suggested from alternate modeling scenarios. Associated projects introduce students to ACSL simulation software. (EMEM-359, SMAM-318; corequisite EMEM-545)
Class 4, Credit 4 (F, W)

EMEM-545 System Dynamics Laboratory
Registration #0304-545
This required laboratory course is designed to give the student experiment-based learning opportunities in system parameter and response characterization, data acquisition, and data analysis. A "system" is defined as any collection of components or subassemblies that behave in a time-dependent manner. Typical systems encountered in this laboratory will be of mechanical, electrical, and electromechanical composition. EMEM-545 gives the student opportunities to experimentally test and evaluate systems modeling, analysis, and design procedures learned in EMEM-543. (corequisite EMEM-543)
Lab 2, Credit 1 (F, W)

EMEM-550 Transport Phenomenon
Registration #0304-550
This is a fundamental course in transport phenomenon leading to advanced topics in heat transfer and fluid flow theory. The students are introduced to the boundary layer theory in external and internal flows. (EMEM-514)
Class 4, Credit 4 (F, W)

EMEM-551 Thermal Fluid Science and Energy Lab II
Registration #0304-551
This is a companion laboratory course for Transport Phenomenon (EMEM-550). It consists of four experiments and includes use of some fluid dynamic software. The experiments cover subsonic wind tunnel, laser doppler anemometer, boundary layer theory, and an experiment involving temperature sensors. Students get hands-on experience with TODOR and ASYST. (EMEM-545, EMEM-550)
Lab 2, Credit 1 (S, SR)

EMEM-560 Introduction to Aerospace Engineering
Registration #0304-560
This course lays the foundation for studies in aerospace engineering. Topics include the history of aviation, basic aerodynamics, airfoils, wings and other aerodynamic shapes, airplane performance, stability and control, propulsion, and aircraft structures. (EMEM-415, EMEM-359)
Class 4, Credit 4 (F or W)

EMEM-599 Independent Study
Registration #0304-599
This is a student project course encompassing both analytical and experimental work. (Fourth- or fifth-year standing)
Class variable, Credit variable (F, W, S, SR)

EMEM-630 Senior Design Project I
Registration #0304-630
This is the first of a two-course capstone design sequence. Students work in design teams in an environment approximating an industrial setting. Emphasis is placed on teamwork and on developing good oral, written, and interpersonal communication skills. In this first course, student teams complete the final design of a mechanical system after identifying possible alternative concepts. Their final design must be supported by sound engineering analyses and by engineering drawings necessary to build a prototype. (Fifth-year standing)
Class 4, Credit 4 (F, W)
EMEM-631 Senior Design Project II
Registration #0304-631
This is the second of the two-course capstone design sequence. The same student teams who worked together in Senior Design I return to build and test a working prototype of their final design completed in Senior Design I. Nonworking prototypes are not acceptable, and some redesign work may be required to make the system work. Continued emphasis is placed on teamwork and on developing good oral, written, and interpersonal communication skills. (EMEM-630)
Class 4, Credit 4 (S)

EMEM-673 Aerodynamics Laboratory
Registration #0304-673
This is a companion laboratory course for EMEM-671 and EMEM-675. It illustrates the behavior of advanced engineering structures and aerodynamic principles common to aircraft and spacecraft design. Students investigate the bending and torsion of thin walled single-cell and multi-cell members. Wind tunnel experiments investigate basic concepts of lift and drag on bluff bodies, wing sections, and lifting bodies. Boundary layer characterization will be simulated on digital computer and investigated experimentally. Structural analysis and design evaluation will also be simulated where appropriate. (EMEM-560; corequisite EMEM-671, EMEM-675)
Lab 2, Credit 1 (S or SR)

Technical Electives

(All technical elective courses have a minimum of 25 percent engineering design content. These are offered at least every other year.) Students shall have completed at least two co-op blocks before taking any technical electives.

EMEM-605 Applications in Fluid Mechanics
Registration #0304-605
This course deals with specific design-oriented applications of fluid mechanics. The course will cover one of the following topics: (a) hydrodynamics, (b) dispersion and diffusion in the environment or (c) two-phase flows. Students are required to design, and sometimes to build, a prototype. Use of computers is encouraged in the design process. (EMEM-440, EMEM-550)
Class 4, Credit 4 (F, W)

EMEM-610 Topics in Mechanical Engineering Design
Registration #0304-610
In response to student and/or faculty interest, special courses of current interest and/or logical continuation of regular courses will be presented. A design project will be required.
Class 4, Credit 4 (TBA)

EMEM-615 Robotics
Registration #0304-615
This is an applied course in the fundamentals and applications of industrial robots. Topics include coordinate systems, drive motors, encoders, sensors, programming, gripper design, safety, economics, machine vision, and flexible manufacturing systems. A major emphasis is placed on a design project involving an industrial problem. (EMEM-437, EMEM-359)
Class 4, Credit 4 (F, W)

EMEM-618 Computer-Aided Engineering and Design
Registration #0304-618
This course introduces the mechanical engineering student to the procedures and techniques used to integrate the computer into the engineering and design cycle. The student is exposed to the computer hardware and software used in mechanical design; that is, solids modeling, finite elements, dynamic analyses, etc. The student will use software on the academic computing system, the workstation laboratory, and personal computers. Concepts associated with the design of interactive graphics display programs for design applications will be presented. A design project is selected from one or more of the topics covered. (EMEM-437, 440, 543)
Class 3, Lab 2, Credit 4 (S)

EMEM-620 Introduction to Optimal Design
Registration #0304-620
This course is an introduction to some 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 by interfacing with available software. A design project is required. (EMEM-440, EMEM-543, EMEM-437)
Class 4, Credit 4 (F, W)

EMEM-635 Heat Transfer II
Registration #0304-635
The course 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 are studied. Design aspects of heat transfer equipment are introduced. A major design project is undertaken by the students. (EMEM-440, EMEM-514)
Class 4, Credit 4 (S, SR) (Alternate years)

EMEM-643 Control Systems
Registration #0304-643
This course introduces the student to the study of linear control systems. The behavior, design, and use of control systems in augmenting engineering system performance is emphasized. Topics include system and control system characterization in time and frequency domains, stability criteria, steady-state error, feedback control, and controller design. This is accomplished through classical methods that employ the use of Laplace transforms, block diagrams, root-locus determination, and Nyquist and Bode diagrams. A companion laboratory will provide students with significant hands-on analysis and design experience. (EMEM-543, EMEM-545)
Class 3, Lab 2, Credit 4 (S) (Alternate years)

EMEM-652 Fluid Mechanics of Turbomachinery
Registration #0304-652
This course 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. It includes a major design project. (EMEM-415)
Class 4, Credit 4 (S, SR) (Alternate years)
**EMEM-658**  
Engineering Vibrations  
Registration #0304-658  
This is a course on the theory of mechanical vibrations with an emphasis on design applications and instrumentation. Fourier analysis techniques, numerical and experimental analysis and design methods are presented in addition to theoretical concepts. Vibrations of single-degree of freedom systems are covered, including free-damped and undamped motion; and harmonic and transient-forced motion, such as support motion, machinery unbalance, and isolation. Modal analysis of multi-degree of freedom systems is introduced. In addition to laboratory exercises on vibration instrumentation, an independent design project is assigned. (EMEM-543)  
Class 3, Lab 2, Credit 4 (F, W)

**EMEM-660**  
Refrigeration and Air Conditioning  
Registration #0304-660  
This is a basic course in the principles and applications of refrigeration and air conditioning involving mechanical vapor compression and absorption refrigeration cycles, associated hardware, psychrometrics, heat transmission in buildings, and thermodynamic design of air conditioning systems. Students are expected to do a design project. (EMEM-413, EMEM-514)  
Class 4, Credit 4 (S, SR)

**EMEM-671**  
Aerostructures  
Registration #0304-671  
A course in the principles of deformable bodies as applied to the analysis and design of aircraft and space vehicle 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. (EMEM-437, EMEM-518)  
Class 4, Credit 4 (S or SR)

**EMEM-672**  
Dynamics of Machinery  
Registration #0304-672  
This course is an introduction to the fundamentals and applications of machinery design. Basic concepts such as linkage classification, mobility, and motion characteristics are introduced. The kinematic and dynamic analyses of planar lower-pair linkages are carried out using analytical vector methods, complex number methods, and graphical methods. The design and analysis of cams are treated by graphical and analytical methods. Major emphasis is placed on a term project in which synthesized mechanism for specific application is kinematically and dynamically analyzed. (EMEM-543)  
Class 4, Credit 4 (S, SR)

**EMEM-675**  
Aerodynamics  
Registration #0304-675  
This course presents the essentials of aerodynamic theory. Topics include airfoil theory, wings of finite span, inviscid potential flows, laminar and turbulent boundary layer, compressible flows, wave drag, and aerodynamic design. (EMEM-560 or EMEM-550 with instructor's consent)  
Class 4, Credit 4 (S or SR)

**EMEM-678**  
Propulsion  
Registration #0304-678  
This course covers 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. (EMEM-514 and EMEM-550 or EMEM-560)  
Class 4, Credit 4 (F or W)

**EMEM-682**  
Flight Dynamics  
Registration #0304-682  
This course deals with the three-dimensional dynamics of aircraft, including general aircraft performance, stability, and control. Topics include determination of range, endurance, and rate of climb; simulation of aircraft trajectory; static and dynamic stability; and aircraft control. (EMEM-560)  
Class 4, Credit 4 (F or W)

**EMEM-694**  
Stress Analysis  
Registration #0304-694  
This course extends the student's theoretical, numerical, and experimental base of knowledge of stressed mechanical components covered in Engineering Mechanics (EMEM-347), Engineering Mechanics Lab I (EMEM-348), and Advanced Computational Techniques (EMEM-518). The governing state properties; the definitions and relationships of stress, strain, and deformations; and the underlying assumptions and results of basic strength of materials are reviewed in much finer detail. Topics from advanced strength of materials and elasticity theory are covered, including unsymmetrical bending, shear flow in thin-walled sections, curved beams, torsion in thin-walled tubes, and three-dimensional coordinate transformations. The fundamentals of the finite element method presented in EMEM-518 are extended to more complex design-oriented problems and demonstrated using commercial finite programs, (Super Sap, and/or NASTRAN, and/or ANSYS). Experimental methods are presented beyond those covered in EMEM-348, with topics including strain gages, photoelasticity, and brittle coating. A design project is assigned in which the student generally employs numerical and/or experimental methods. (EMEM-437, EMEM-440)  
Class 4, Credit 4 (S, SR) (alternate years)

**EMEM-698**  
Independent Study Design Project  
Registration #0304-698  
This is a design-oriented independent study requiring a major design project. (Senior standing)  
Credit 4

**Free Elective Courses**

Typically at least three electives from the list are offered every year.

**EMEM-600**  
Topics in Mechanical Engineering  
Registration #0304-600  
In response to student and/or faculty interest, special courses of current interest and/or logical continuation of regular courses will be presented.  
Class 4, Credit 4 (TBA)
EMEM-637 Laser Engineering
Registration #0304-637
Laser Engineering studies the applications of lasers as engineering tools. Background physics relevant to the operation of a laser and the interaction of light with matter are given. Safety regulations are discussed and specific applications in industry are covered. (SPSP-314)
Class 4, Credit 4 (S) (alternate years)

EMEM-651 Viscous Flows
Registration #0304-651
A course in fluid mechanics covering incompressible laminar and turbulent boundary layers. General properties of Navier-Stokes equations, some exact solutions. Boundary layer equations, some exact and approximate solutions for two-dimensional steady flows. Boundary layer controls. Theories of turbulence and turbulence modeling. (EMEM-516)
Class 4, Credit 4 (TBA)

EMEM-685 Advanced Strength of Materials
Registration #0304-685
This course is a continuation of Engineering Mechanics (EMEM-347) and also serves as a bridge to graduate courses in mechanics (e.g., Continuum Mechanics, Theory of Plates and Shells). Contents: Statically indeterminate problems for beams; frames; continuous beams; beams of variable cross-section; beams on elastic foundations; torsion; limit analysis; energy methods for beams, curved bars, and frames; stability; rotating discs; introduction to composite materials. (EMEM-437)
Class 4, Credit 4 (TBA)

EMEM-687 Engineering Economy
Registration #0304-687
This course deals with the study of cost concepts; nominal and effective interest rates; and selection of investment alternatives based on present, annual, and future worth methods. Effects of various methods of depreciation and impact of taxes on investments are also presented. (Fifth-year standing)
Class 4, Credit 4 (S)

Microelectronic Engineering

EMCR-201 Introduction to Microelectronics
Registration #0305-201
This course will provide the student with introductory and career information about the profession of microelectronic engineering. Students study how integrated circuits are made and fabricate a custom integrated circuit as part of the laboratory. Students use the Integrated Circuit Facility for the laboratory portion of this course.
Class 3, Lab 3, Credit 4 (F)

EMCR-215 Introduction to Microelectronics—Transfer
Registration #0305-215
This course contains approximately 75 percent of the material covered in EMCR-201 and EMCR-350. For transfer students.
Class 3, Lab 3, Credit 4 (F)

EMCR-221 Introduction to Microlithography
Registration #0305-221
This course provides an introduction to the fundamentals of imaging and photographic science. Topics include: radiometry and photometry, exposure, silver halide materials, photosists, speed and spectral sensitivity, sensitometry, optics, resolving power, limits of optical microlithography, measurement and control of line width, special exposure effects, and contact and projection printing systems.
Class 3, Lab 3, Credit 4 (F, S)

EMCR-350 Integrated Circuit Technology
Registration #0305-350
An introduction to integrated circuit technology and the physics, chemistry and metallurgy of manufacturing with an emphasis on photolithography. The laboratory includes safety, laboratory techniques, processing and testing. Students design and build an integrated circuit. (EMCR-201)
Class 3, Lab 3, Credit 4 (S)

EMCR-520 VLSI Design
Registration #0305-520
A study of NMOS and CMOS processes, design rules, and methodologies. Standard cell layout, schematic capture, simulation, and cell placement and routing. A student project is required. (EMCR-560, EEEE-442)
Class 4, Credit 4 (S, SR)

EMCR-530 Electromagnetic Fields I
Registration #0305-530
A study of electrostatics and magnetostatics important to the understanding of the physics of semiconductor devices and microelectronic processing. (SMAM-328, SPSP-313)
Class 4, Credit 4 (F, W)

EMCR-540 Electromagnetic Fields II
Registration #0305-540
A study of time varying electromagnetic fields important to optical and electrical systems. Topics include Maxwell's equations, wave equations, electromagnetic propagation in free space and guided structures, concepts of reflection, transmission and matching. (EMCR-530)
Class 4, Credit 4 (S, SR)

EMCR-560 Device Physics
Registration #0305-560
A basic course dealing with the physics of semiconductor devices. Topics include physics of semiconductor materials, metal-semiconductor contacts, PN junctions, bipolar transistors, MOS structures and field effect transistors. (EEE4-441, SPSP-315)
Class 4, Credit 4 (F, W)

EMCR-573 Microlithography I Laboratory
Registration #0305-573
Laboratory course to be taken concurrently with PIMG-563. Topics emphasize photolithographic process characterization techniques. (PIMG-221, EMCR-350)
Lab 3, Credit 1 (S, SR)

EMCR-575 Microlithography II Laboratory
Registration #0305-575
Laboratory course to be taken concurrently with PIMG-565. Topics emphasize advanced lithographic processes. (PIMG-563, EMCR-573)
Lab 3, Credit 1 (F, W)
EMCR-599 Independent Study
Registration #0305-599
A supervised investigation within a microelectronic area of student interest. (Permission of instructor)

Class variable, Credit variable

EMCR-630 Advanced Microelectronic
Registration #0305-630 Chemistry
A selection of topics from physical and plasma chemistry important to the understanding of integrated circuit processing, including plasma etching, chemical vapor deposition, and related technologies. (PIMG-563, EMCR-573, EMCR-350)

Class 3, Lab 3, Credit 4 (F, W)

EMCR-631 Microelectronic Manufacturing I
Registration #0305-631
A manufacturing course. Topics include scheduling, work in progress tracking, costing, inventory control, capital budgeting, productivity measures, and personnel management. The laboratory for this course is the student-run factory. Lot tracking, data collection, lot history, cycle time, turns, and statistical process control are introduced to the student. (EMCR-640, 650)

Class 3, Lab 3, Credit 4 (W)

EMCR-640 Microelectronics
Registration #0305-640
An intermediate course in the study of integrated circuit processing. Topics include diffusion, oxidation, ion implantation, bipolar and MOS processes. Extensive use of CAE tools such as SUPREM and PISCES. (EMCR-350, 560, 573; EEEE-442, PIMG-563)

Class 4, Credit 4 (S, SR)

EMCR-650 Integrated Circuit Processing Lab
Registration #0305-650
A laboratory course in which the student designs and builds an integrated circuit. Required lab work includes MOS C-V, PMOS and bipolar I.C. fabrication and safety. (EMCR-640)

Class 2, Lab 6, Credit 4 (F, W)

EMCR-660 Seminar/Research
Registration #0305-660
An opportunity for independent, in-depth study on a project of mutual interest to the student and faculty. A presentation to industry representatives at our annual conference and a technical paper on the results are required to enhance the student's technical communication skills. Seminars by various experts in the microelectronics field are arranged to broaden the student's knowledge. (EMCR-650)

Class 2, Lab 6, Credit 4 (S)

EMCR-670 Advanced Microlithography
Registration #0305-670
A study of the characteristics of image-forming and image-recording elements and their matching for optimum performance. Spread and transfer functions, partial coherence in image systems, limitations imposed by the wave and particle nature of radiation. Interferometric evaluation techniques. Techniques and instruments for the exposing and evaluation of images. (EMCR-540, 575; EEEE-455, PIMG-543, 565)

Class 3, Lab 3, Credit 4 (S)
College of Imaging Arts and Sciences

School of Art and Design

FADC-301,302,303 Introduction to Graphic Design Registration #0402-301,302,303
An introduction to the field of graphic design through explorations of formal and perceptual understanding and control; deals with point, line, shape, color, pattern, organizational systems, Gestalt principles, dimension interaction and communications. The relationship of typography and photography to graphic design is included. Recommended course work also includes concentrated work in typography, photography, and art for reproduction methods. (Foundation program or equivalent required) Prerequisite for major in Graphic Design.
Lab 9, Credit 4 (offered each year)

FADC-401,402,403 Graphic Design Registration #0402-401,402,403 (Junior Major)
Creative problem solving experiences relating to visual communication imagery based on strong emphasis of formal design values and their utilization for the communication of ideas and information. Assignments oriented to building a working knowledge of communication media areas such as print, photography, typography, etc. Media Center facility available for extension and application of studio experiences. (FADC-301, 302, 303 or equivalent)
Lab 12, Credit 6 (offered each year)

FADC-411,412,413 Graphic Design Registration #0402-411,412,413
An elective providing the opportunity to carry on problem solving in graphic design. Each quarter concentrates on a specific design topic of study (such as design for reproduction, design of self-promotional material, typography, or computer graphics)
Lab 6, Credit 3 (offered each year), Elective

FADD-311,312,313 Industrial, Interior and Packaging Design Registration #0403-311,312,313
An elective offering basic instruction and involvement in design application projects. Each quarter concentrates on a specific topic of design study.
311—Environmental
312—Interior
313—Environmental
Lab 6, Credit 3 (offered each year), Elective

FADD-320 Graphic Visualization Registration #0403-320
Graphic visualization techniques for the development and presentation of concepts for three-dimensional designs. Familiarization with various media in developing and improving graphic communication skills of value to the designer.
Lab 6, Credit 3 (offered on sufficient demand)

FADD-411,412,413 Design Applications Registration #0403-411,412,413
An elective that provides basic instruction in three dimensional computer graphics applications for designers.
Lab 6, Credit 3, Elective

FADD-401,402,403 Industrial Design II Registration #0402-401,402,403 (Junior Major)
The acquisition of a technical and theoretical base in industrial design. Application of communicative and problem-solving skills to comprehensive design projects involving form.
401—Design development of small equipment through sketches and quick study mock-ups, together with the introduction to materials and processes.
402—The integrated development of human factors and consumer product design, emphasizing understanding, style, function, and safety
403—Exhibits and Layout Systems
Lab 9, Credit 4 (offered each year)

FADD-501,502,503 Industrial Design III Registration #0402-501,502,503 (Senior Major)
The application of design methods and skills to professional level projects in industrial design.
501—Advanced product development based on a corporate design program providing technical information, marketing concerns and outside review of work
502—History of 20th century furniture design is reviewed as a context for designing furniture for a defined market. Professional practice including writing contracts or letters of agreement, business and contractual agreements
503—A special student-interest project in industrial design including resume and portfolio design. Design issues and ethics are explored through examination of biographical material.
Lab 18, Credit 9 (offered each year)
FADI-301,302,303 Interior Design
Registration #0444-301,302,303 (Sophomore Core)
An introduction to interior design. Emphasis is on the basic skills
and processes for spatial relationships, design conceptualization,
and development.
301—Architectural Visualization
302—Architectural Drafting
303—Spatial Studies and Relationships
Lab 9, Credit 4 (offered each year)

FADI-401,402,403 Interior Design II
Registration #0444-401,402,403 (Junior Major)
The acquisition of a technical and theoretical base in interior
design. Application of communicative and problem-solving
skills to comprehensive design projects involving space and
including environmental control, decorative arts and materials.
Lab 12, Credit 6 (offered each year)

FADI-501,502,503 Interior Design III
Registration #0444-501,502,503 (Senior Major)
The application of design methods and skills to professional level
projects in interior design with an emphasis on space planning,
construction documents, furniture, professional practices and
career development.
Lab 18, Credit 9 (offered each year)

FADK-401,402,403 Packaging Design II
Registration #0440-401,402,403 (Junior Major)
The course progresses through a series of interrelated
experiments, covering analysis and visual translation of package
form and function, package structure, production processes,
package trends, materials, and package graphics.
Lab 9, Credit 4 (offered each year)

FADK-501,502,503 Packaging Design III
Registration #0440-501,502,503 (Senior Major)
The course will further investigate analysis and visual translation of
package form and function, package structure, production
processes, package trends, construction, materials and package
graphics. A strong emphasis will be placed on preparation of a
portfolio.
Lab 9, Credit 4 (offered each year)

FADF-205,206,207 Creative Sources
Registration #0404-205, 206,207
This course is designed to make students aware of themselves,
their experiences, and their environment as tools for creative
problem solving. This will be accomplished through lectures,
individual and group assignments, demonstrations, and guest
speakers.
Class 1, Lab 1, Credit 2 (offered each year)

FADF-210,211,212 Drawing
Registration #0404-210, 211,212
A basic foundation in drawing as a form of creative expression
and a means to communicate information. Through the use of
organic and inorganic materials, attention is given to individual
response to "seeing" as interspersed with all sensory
conditioning. The figure is utilized in the analysis of action,
structure, and gesture through quick sketches.
Lab 18, Credit 9 (offered each year)

FADF-221,222,223 Design for Photo I
Registration #0404-221, 222,223
Study of principles of two- and three-dimensional design as a
means of communication and expression.
Class 1, Lab 2, Credit 2 (offered each year)

FADF-231, 232, 233 2-D Design
Registration #0404-231, 232,233
A structured introduction to the fundamentals of design and color
with media exploration in two dimensions, concentrating on
concept development, visual recognition and organization, and
skill development through creative problem solving.
Lab 6, Credit 3 (offered each year)

FADF-241,242,243 3-D Design
Registration #0404-241, 242, 243
The elements of design and their structural relationship as applied
to problems in three dimensions. A variety of media are used.
Lab 6, Credit 3 (offered each year)

FADF-261,262,263 Drawing (Crafts Majors)
Registration #0404-261,262,263
Drawing in variety of media. Introduction to line, form, and
color as elements of pictorial and object description and
presentation. Drawing systems utilizing perspective,
visualization, and spatial illusion.
Lab 6, Credit 3 (offered each year)

FADF-321,322,323 Design for Photo II
Registration #0404-321,322,323
Emphasis upon problems which are related to visual phenomena,
fundamentals, and communications. Expression through image
making viewing and discussion.
Class 1, Lab 2, Credit 2 (offered each year)

FADF-301,302,303 Introduction to Fine Arts
Registration #0405-301,302,303 (Sophomore Core)
Fine arts core for painting and printmaking. Course of study in-
volves painting, printmaking, and sculpture studio on the basis of
one full day, for a single quarter each, with additional one-half
day in drawing studio throughout the three quarters. Emphasis
will be placed on drawing and the objective mastery of form,
space, and expression from a variety of sources, including the
human figure. Emphasis upon basic techniques, materials, and
concepts for further study in painting, printmaking, and sculpture.
(Prerequisite: Foundation program or equivalent)
Lab 9, Credit 4 (offered each year)

FADF-320 Color
Registration #0405-320
One-quarter course dealing with the examination of basic color
phenomena by visual comparison. Study the differences between
light and pigment. Class problems exploring such relationships as
intensity, vibration, temperature, after-image, spatial effects and
image-ground distortion.
Class 3, Lab 3, Credit 3 (offered each year)

FADF-401,402,403 Painting (Junior Major)
Registration #0405-401,402,403
Second year of painting in a three-year degree sequence.
Development of mastery of painting media and the experience of
drawing. Emphasis placed upon individual solutions and
expression.
Lab 12, Credit 6 (offered each year)
developed with the participation of all students. Encouragement is provided for students to exhibit professionally in regional and national exhibitions. Emphasis is placed on preparing a strong professional body of prints.

Lab 18, Credit 9 (offered each year)

FADR-511,512,513 Printmaking (Senior Major)
Registration #0406-511,512,513
An elective that provides further exploration of printmaking with emphasis on personal statement.
Lab 6, Credit 3 (offered each year)

FADR-411,412,413 Printmaking (formerly Painting-Illustration)
Registration #0406-411,412,413
An elective providing the opportunity to explore personal statements through one of the following: lithography, etching, woodcut, papermaking.
Lab 6, Credit 3 (offered each year), Elective

FADR-501, 502, 503 Printmaking (Senior Major)
Registration #0406-501, 502,503
Continuation of third-year printmaking. Expanding the technical involvement in paper making, photo etching and photo litho. Opportunity is presented for involvement in developing a more concentrated and personal art form through any singular technique or combination. A limited edition portfolio project is developed with the participation of all students. Encouragement is offered for students to exhibit professionally in regional and national exhibitions. Emphasis is placed on preparing a strong professional body of prints.
Lab 18, Credit 9 (offered each year)

FADR-511,512,513 Printmaking
Registration #0406-511,512,513
An elective that provides further exploration of printmaking with emphasis on personal statement.
Lab 6, Credit 3 (offered each year)

FADR-501, 502, 503 Printmaking (formerly Painting-Illustration)
Registration #0406-501, 502,503
Continuation of third-year printmaking. Expanding the technical involvement in paper making, photo etching and photo litho. Opportunity is presented for involvement in developing a more concentrated and personal art form through any singular technique or combination. A limited edition portfolio project is developed with the participation of all students. Encouragement is offered for students to exhibit professionally in regional and national exhibitions. Emphasis is placed on preparing a strong professional body of prints.
Lab 18, Credit 9 (offered each year)
School for American Craftsmen

FSCC-200 Ceramics Materials and Processes (Freshman Major)
Registration #0409-200
The focus of study deals with a personal view of functional ceramic ware. Techniques presented include wheel throwing, hand building, glazing, decorating, and kiln firing. The history of pottery and ceramics sculpture as well as clay and glaze chemistry is offered.
Lab 6, Credit 3 (offered each year)

FSCC-251,252,253 Ceramics Elective I
Registration #0409-251, 252,253
An elementary course in design and techniques in ceramics. Each quarter different techniques are taught including wheel, hand building, glaze, and decorating.
Lab 6, Credit 3 (offered each year)

FSCC-300 Ceramics Materials and Processes (Sophomore Major)
Registration #0409-300
Ceramic projects challenge the student to develop conceptual attitudes and widen the scope of creativity. Projects undertaken provide training and experience in a variety of hand-forming/wheel-throwing techniques and firing methods.
Lab 15, Credit 5 (offered each year)

FSCC-351,352,353 Ceramics Craft Elective II
Registration #0409-351,352,353
An elective course providing an opportunity for more advanced study in ceramics. Wheel and hand built pottery, along with glaze information, will be studied.
Lab 6, Credit 3 (offered on sufficient demand)

FSCC-400 Ceramics Materials and Processes (Junior Major)
Registration #0409-400
Personal interpretation of the issues in contemporary ceramics will be investigated. Each student will develop a proposal to be approved by the faculty. The proposal will enhance self expression and a personal direction in clay.
Lab 15, Credit 5 (offered each year)

FSCC-500 Ceramics Techniques and Thesis
Registration #0409-500
Sequential course for three quarters focusing on thesis development of a body of work that reflects self expression, and a personal direction in clay. This research and thesis project will stress a high level of aesthetic content and skilled execution.
Lab 24, Credit 8 (offered each year)
FSCF-360 18th & 19th Century Art
Registration #0410-360
The development of the arts in these two centuries in the areas of painting, printmaking, sculpture, architecture, and the crafts with emphasis on their influence of 20th century styles and focusing on their impact on the artist/craftsman/designer.
Class 3, Credit 3 (offered each year)

FSCF-370 20th Century Art
Registration #0410-370
The development of the arts in the 20th century in the areas of painting, printmaking, sculpture, architecture, and the crafts with focus on their impact on the artist/craftsman/designer.
Class 3, Credit 3 (offered each year)

FSCF-380 Contemporary Art
Registration #0410-380
A study of the painting, printmaking, sculpture, architecture and crafts from the 1960s to the present year with focus on the current American scene.
Class 3, Credit 3 (offered each year)

FSCF-420 American Art
Registration #0410-420
A survey of the development of the visual arts (art, architecture, crafts, design, sculpture) in America from pre-Colonial times through 1865.
Class 3, Credit 3 (offered each year)

FSCF-430 Dada and Surrealism
Registration #0410-430
Explores the Dada and Surrealist movements in Europe and the United States from 1916 through the post-World War II period. Emphasis is on identifying the major works of artists involved in these aesthetic developments. Ideology and formal ideas will be analyzed in paintings, literary works, films, and objects.
Class 3, Credit 3 (offered each year)

FSCF-440 Conceptual Art
Registration #0410-440
Explores the mid-1960s movement in which artists began to regard the phenomenon of art making more in terms of process or concept and less in terms of the end product. The student will be acquainted with various facets of theory and design-oriented works in the United States, Canada, South America, and Europe.
Class 3, Credit 3 (offered each year)

FSCF-450 Pop Art and Pop Culture
Registration #0410-450
This course will explore the social, cultural, and political context within which this movement of the 1960s developed. Emphasis will be on artists in New York and Britain. Lectures, discussions, and films will comprise the course content.
Class 3, Credit 3 (offered each year)

FSCF-460 Media Advertising and Consciousness
Registration #0410-460
The function of this course is to provide a discourse on the interaction of media and advertising through both historical and theoretical means. The historical part of the course will deal with the social impact of industry on “modern life” at the turn of the century. The theoretical part of the course will discuss the impact of advertising and media on social consciousness.
Class 3, Credit 3 (offered each year)

FSCF-566 Special Topics
Registration #0410-566
Consideration of special art historical themes, areas, and topics not covered in regular courses.
Class 3, Credit 3 (offered each year)

FSCG-200 Glass Materials and Processes (Freshman Major)
Registration #0411-200
A basic survey course of the properties, techniques and technology of glass, plus an overview of glass history. Individuals are encouraged to participate in a variety of hot and cold glass techniques: blowing basic shapes, stemware, color applications, stained/leaded glass, lamination, polishing, sand casting, and slumping/fusing. Basic knowledge of technique lays the foundation for concept development.
Lab 15, Credit 5 (offered each year)

FSCG-251,252,253 Glass Elective I
Registration #0411-251,252,253
A survey course emphasizing furnace glassblowing and stained glass as a means of personal expression and appreciation. A portion of the course is a basic investigation of the history, chemistry, techniques and technical aspects of glass.
Lab 6, Credit 3 (offered each year)

FSCG-300 Glass Materials and Processes (Sophomore Major)
Registration #0411-300
Techniques of stationary/multi-sectional mold blowing, color overlay, graphal, and latticino are examples of continued emphasis on blown glass. Neon bending, sealing and bombarding; gravity casting, pate-de-verre, engraving, fabrication and architectural stained glass are offered. In-depth history of glass and the decorative arts, plus practical chemistry of glass, batching and LEC will be learned.
Lab 15, Credit 5 (offered each year)

FSCG-351,352,353 Glass Elective II
Registration #0411-351,352,353
Prerequisite: Glass Elective 251, 252, or 253. This course provides an opportunity for more advanced work in both hot and cold glass. Emphasis is placed upon individual expression with glass and may involve slumping, casting, blowing, cutting, polishing or sculptural construction.
Lab 6, Credit 3 (offered on sufficient demand)

FSCG-400 Glass Materials and Processes (Junior Major)
Registration #0411-400
Design projects from decorative arts companies are undertaken. Knowledge of glass studio design/construction, equipment and business practices is acquired. The journeyman's series piece is planned, designed and executed. Technices of enameling, electroforming and advanced casting processes are investigated. The conceptualization process is further developed through spatial/environmental projects.
Lab 15, Credit 5 (offered each year)

FSCG-500 Glass Techniques and Thesis (Senior Major)
Registration #0411-500
Based upon the three previous years of investigation, the senior-level glass student will present a proposal which will be offered as evidence of qualification for the baccalaureate degree. The senior will present a resume, portfolio and a research paper related to his/her exhibition at the end of the academic year.
Lab 24, Credit 8 (offered each year)
Lab 15, Credit 5 (offered each year)

procedures; silk screen techniques.

combinations of various yarns. Yardage weaving. Printing

upholstery, and suiting fabrics. Study of qualities and color

equipment and problems. Practice in basic weaves. Experiments

in design and weaving of sample warps of drapery, linens,

leading, foiling, glazing stained glass.

Lab 6, Credit 3 (offered on sufficient demand)

Lab 15, Credit 5 (offered each year)

Lab 6, Credit 3 (offered each year)

Lab 6, Credit 3 (offered each year)

Lab 15, Credit 5 (offered each year)

Lab 6, Credit 3 (offered on sufficient demand)

Lab 15, Credit 5 (offered each year)

Lab 6, Credit 3 (offered on sufficient demand)

Lab 15, Credit 5 (offered each year)

Lab 24, Credit 8 (offered each year)

A basic course in design and techniques in textiles. Each quarter a
different area of study is undertaken in quilt making, natural
basketry, crochet, soft sculpture, or other non-loom textile
processes.

Lab 6, Credit 3 (offered on alternate year)

Lab 15, Credit 5 (offered each year)

Lab 6, Credit 3 (offered on sufficient demand)

Lab 15, Credit 5 (offered each year)

Lab 24, Credit 8 (offered each year)

Fundamental craft business practices, including setting up a
business, basic record keeping, banking, pricing, government
regulations, insurance, marketing, and studying operations.
Class 3, Credit 3 (offered every other year)

Lab 15, Credit 5 (offered each year)
FSCW-220 Woodworking Materials and Processes (Freshman AOS Major)
A sequential course for three quarters covering the fundamental techniques and aesthetics of woodworking. Topics covered include the care and use of hand and machine tools, wood as a material, its basic properties, basic joinery and fundamental techniques of wood fabrication, and finishing. The course includes a machine maintenance program.
Lab 18, Credit 5 (offered each year)

FSCW-231,232,233 Technical Drawing (AOS Major)
A sequential course for three quarters covering basic drafting technique as it is used for purposes of both design and presentation. Topics covered include lettering, use of instruments, dimensioning, basic layout techniques and formats, orthographic projection, sectioning, auxiliary views, axonometric drawing, perspective sketching and visualization, measured perspective and presentation techniques.
Lab 3, Credit 2 (offered each year)

FSCW-251,252,253 Wood Elective I
An elementary course in design and techniques in woodworking. Hand and power tools will assist in the making of small scale wood objects.
Lab 6, Credit 3 (offered each year)

FSCW-300 Woodworking Materials and Processes (Sophomore Major)
Sequential course for three quarters, covering advanced design, layout and construction. Plywood construction, chairmaking and chest of drawers technique. Historical development of furniture; papers and reports.
Lab 15, Credit 5 (offered each year)

FSCW-320 Woodworking Materials and Processes (Sophomore AOS Major)
A sequential course for three quarters covering advanced topics of woodworking. This is an intensive studio course focusing on both aesthetic and technical problems. Topics include the use of man-made materials, drawer and solid wood carcass construction, issues related to production work and student initiation of specific interest projects. The course includes a machine maintenance program.
Lab 24, Credit 7 (offered each year)

FSCW-331,332,333 Furniture History (AOS Major)
A sequential course for three quarters covering a survey of the history of furniture from Egyptian times to the present. There is particular attention given to the social, functional, technological, and cultural background of furniture use and production. The lives, works and influence of known furniture designers and craftsmen will be emphasized. The course will include lectures, independent study, reports, and designing furniture based on historical models.
Lab 3, Credit 2 (offered each year)

FSCW-341,342,343 Wood Professional Practices (AOS Major)
A sequential course for three quarters covering topics associated with the profession of woodworking. These include employment options, portfolio, resume writing, business cards and stationery, marketing, customer relations, contracts and other legal issues, record keeping, banking, insurance, taxes, location and layout of a shop and electrical and machinery considerations. The course will include lectures, independent study, assigned studio visits, papers, reports, and guest speakers.
Lab 3, Credit 2 (offered each year)

FSCW-400 Woodworking Materials and Processes (Junior Major)
Sequential course for three quarters covering advanced concepts in furniture and woodworking, drawer construction, wood sculpture, and veneering. Emphasis will be placed on enlarging student's vocabulary of form.
Lab 15, Credit 5 (offered each year)

FSCW-500 Woodworking Techniques and Thesis (Senior Major)
Sequential course for three quarters, allowing each student, with approval of the instructors, to specialize in that branch of woodworking/furniture design that he/she intends to pursue following graduation. The thesis, culminating in the final quarter, consists of a body of work including at least one commissioned piece, and a complete business promotion package including a portfolio, resume, and stationery.
Lab 24, Credit 8 (offered each year)

FSC(C, G, M, T, or W)-478 Professional Studio Internship
This internship is designed to give qualified students and professionals the opportunity to spend one or two quarters in the personal studio of a faculty member from the School for American Craftsmen in order to gain practical experience in the day-to-day operation of a professional studio. Selection of applicants will be based on background, portfolios, and interviews.
40 hour week, Credit 8 (offered by special approvals)
School of Photographic Arts and Sciences

All courses in the School of Photographic Arts and Sciences are offered at least once annually, except as noted.

Fine Art Photography

PPHA-207 Still Photography Registration #0921-207
In the first quarter students become familiar with the 35mm camera, processing and printing. The work is restricted to black-and-white photography. The aesthetics and basic understanding of photographic practice are covered. The second and third quarters deal with more advanced techniques and principles of photography. This series of courses is available for students who are not majoring in photography.

Class 1, Lab 6, Credit 3

PPHA-208 Still Photography II Registration #0921-208
A basic studio course for the hobbyist or someone who occasionally uses photography in his or her work. Covers how to light and photograph 2-D work (copy) such as drawings, paintings, or old photographs; and how to light and photograph 3-D objects (inanimate) and people. Ideas of portraiture are discussed and explored in a natural (rather than commercial) manner, both of one person and then of two people. The idea of self-portrait also is discussed and explored. (PPHA-207 or a working knowledge of developing film and making enlargements)

Class 1, Lab 4, Studio 2, Credit 3

PPHA-209 Still Photography III Registration #0921-209
A one-quarter course in which students determine their own theme, develop and shape it into picture book form with the use of some words. (PPHA-207 or a working knowledge of developing film and making enlargements; permission of instructor)

Class 1, Lab 6, Credit 3

PPHA-301,302,303 History of Aesthetics of Photography Registration #0921-301,302,303
Covering the history and aesthetics of photography from 1839 to the present, with special emphasis on the development of photographic seeing, and its related effect on other media. A survey of the numerous processes and how their development affected the image making of their particular period, i.e., daguerreotypes, collotypes, ambrotypes, etc. Lectures will introduce historical alterations such as collage, montage, hand coloring, xerox, hand-coated emulsions, etc. Lectures will introduce historical perspective on artists using these techniques and also will feature demonstrations of various imaging systems and their integration.

Class 3, Credit 3

PPHA-313 Introduction to Fine Art Photography Registration #0921-313
The meaning of fine art photography will be discussed and then explored by doing various fine art assignments which will lead the student to discover personal solutions to personal concerns. The faculty will provide surveys of fine art photographers, their work and the non-silver processes sometimes used. The class will be supplemented with field trips to museums, galleries, and artists' studios.

Class 2, Lab 8, Credit 4

PPHA-323 Photo Media Survey Registration #0921-323
Students will experiment with image combinations and alterations such as collage, montage, hand coloring, xerox, hand-coated emulsions, etc. Lectures will introduce historical perspective on artists using these techniques and also will feature demonstrations of various imaging systems and their integration.

Class 1, Lab 4, Credit 3

PPHA-325 Introduction to Computer Graphics for Photographic Imagemaking Registration #0921-325
Introduction to computers and computer graphics emphasizing their use in photographic imagemaking. Course utilizes basic graphics and photographic manipulation programs to introduce important concepts in computers and computer-based imagemaking. Integration of tools to student's own artistic process is emphasized. (PPHA-207)

Class 3, Lab 2, Credit 4

PPHA-401,402,403 Photography as a Fine Art I Registration #0921-401,402,403
The major emphasis is placed on the individual's learning to identify and articulate a personal response to his or her environment through the medium of photography. Students design their own projects and work under the guidance of the professor. Traditional silver, as well as non-silver, photography techniques may be utilized. (PPHA-313)

Class 3, Field trip 2, Credit 4 per quarter

PPHA-411,412,413 Contemporary Issues Registration #0921-411, 412,413
An examination of many thought-provoking and/or controversial issues in photography from 1950 to the present through a series of lectures, readings and discussions. Topics to be covered include post-modernism, genderism, pornography, censorship, altered images, connoisseurship, and others. The course format allows review and exploration of such themes as the landscape, the nude, portraiture, conceptual art, trompe l'oeil and so on. Students will prepare an oral debate or a written term paper.

Class 2, Credit 2

PPHA-460 Photography for Printers Registration #0921-460
A workshop in black-and-white and color photography for non-photography majors. Technical and aesthetic information will enhance non-vocational photographers' use of their equipment. Darkroom work will be limited to the black-and-white negative and print. Color work will emphasize improvement of camera techniques.

Class 2, Lab 4, Credit 4

PPHA-501,502,503 Photography as a Fine Art II Registration #0921-501, 502,503
Emphasis is placed on the student's setting of goals, selection of assignments and projects, and expansion of work on his or her own terms. Lectures and experiences are oriented to encourage awareness of shared concepts in the other arts, goals set by working artists, and the relevance of the history of the visual arts to the student's work. (PPHA-403)

Class 2, Lab 8, Credit 4
PPHA-506,507,508  Photo Media Workshop  
Registration #0921-506,507,508  
Photo Media Workshop emphasizes visual problem solving utilizing alternative photographic processes. The first quarter features work with emulsions on various surfaces; the second deals with visual books; and the third quarter covers generative systems including electrostatic, offset printing and other methods of altering images. The course is best when taken in order, but students may join in at any quarter. (PPHA-323)  
Class 2, Lab 4, Credit 4

PPHA-521,522,523  Color Photography Workshop  
Registration #0921-521,522,523  
Emphasis is on the creative and aesthetic aspects of color photography and other color imaging systems. Students are provided with an opportunity to explore the variety of ways in which color photographs can be produced, reproduced, sequenced, displayed and preserved. A personal portfolio of work presented as color prints, color transparencies, a slide presentation, an exhibition or as an art book is required for each quarter. (Basic color course)  
Class 2, Lab 4, Credit 4 (not offered every year)

PPHA-525  Archival Photographies: Processing, Display, and Storage  
Registration # 0921-525  
An introductory course surveying current findings in photographic conservation with an emphasis on acquiring and applying skills for archival processing, presentation, transportation, and storage of photographic images. Laboratory sessions include research visits and field trips.  
Class 2, Lab 4, Credit 4

PPHA-531  Picture Researching  
Registration # 0921-531  
An introductory course surveying current practices, procedures, techniques, and resources employed in picture researching for collections, exhibitions, publications, motion pictures, and television. Students explore the ways pictures are used in communications, establish what pictures are needed for specific projects, discover how they may be found (or produced), and make arrangements to obtain reproduction rights. A case history in picture researching and a personal picture-researching project will be produced by each student. (Basic course in history of photography or equivalent)  
Class 2, Critique 2, Field Research 4, Credit 4

PPHA-535  Gallery Management  
Registration #0921-535  
A basic, hands-on course in gallery operation to include gallery management and aesthetics. Course work is done with actual shows in the RIT photo gallery and other galleries where appropriate.  
Class 2, Credit 1 (not offered every year)

PPHA-538  Photographic Careers Seminar  
Registration #0921-538  
This seminar examines career options available to photography graduates. Students develop skills in resume preparation, interview practices and techniques, and personal goal setting. Students attend three special sessions offered by the Center for Cooperative Education and Career Services. (Third- or fourth-year status with visual studies background)  
Class 1, Lab 6, Credit 4

PPHA-551,552,553  Special Topics Workshop  
Registration #0921-551, 552,553  
Topics of current or special interest designed to broaden and intensify the students' ability to use photography as a means of communication and expression.  
Class 1-2, Lab 4-15, Credit 3-9

PPHA-560  Semiotics and Advertising  
Registration #0921-560  
An introductory course which emphasizes the application of selected semiotic principles to the practice of photography. Semiotics is the study of signs and symbols and what they signify.  
Class 2, Lab 4, Credit 4

PPHA-599  Independent Study  
Registration #0921-599  
Learning experiences not provided by formal course structure may be obtained through use of an independent study contract. Credit 1-9

Biomedical Photography

PPHB-201,202,203  Biomedical Photography I  
Registration #0901-201,202,203  
Basic photography course for biomedical photographers with emphasis on theory, craftsmanship and visual communication. Patient photography, close-up and other photography as a foundation for future biomedical photography.  
Class 4, Lab 4, Studio 4, Credit 6

PPHB-211  Survey of Biomedical Photography  
Registration #0901-211  
Career opportunities, typical biomedical photography settings, types of photography performed. Ethical, professional, and personal relationships with patients, physicians, research and staff personnel.  
Class 1, Credit 1 (S only)

PPHB-301,302,303  Biomedical Photography II  
Registration #0901-301,302,303  
Further study and practice of theory and principles used in biomedical photography, including photomacography, photomicrography, hospital photography techniques, infrared and ultraviolet radiation, biological field studies. (PPHB-203)  
Class 2, Lab 10, Credit 5

PPHB-331,332  Preparation of Biomedical Visuals  
Registration #0901-331,332  
Study of basic principles of effective visual communication and design. Student will produce slide presentations and exhibition displays as well as anatomical demonstrations using cell animation techniques. (PPHB-203)  
Lecture 2, Lab 2, Credit 3

PPHB-335  Basic Ophthalmic Photography  
Registration # 0901-335  
This course will investigate proper patient, camera, and photographic techniques in ophthalmic photography. Diagnostic evaluation of ocular anatomy and physiology utilizing special cameras will be presented. (PPHB-300 series or permission of instructor)  
Class 2, Lab 4, Credit 4
PPHB-350 Photomacrography
Registration #0901-350

Photomacrography is a technique that provides a universal depth of field in photomacrograph while producing an isometric projection at the same time. A thin sheet of light is projected onto a three-dimensional subject at a right angle to the optical axis of the camera lens within the depth of field to be photographed. The subject is then precisely moved along this optical axis while the camera shutter is open. Out-of-focus areas remain in darkness and are not recorded during the time the illuminated strip is exposed. Students will learn the principles and applications of this technique, producing images of exceptional clarity in black-and-white as well as color. The precise and often unique disciplines required to make these images prepare the students for other scientific photographic tasks as well as fulfill an existing need for scanning photomacrographs in the biological sciences. (PPHB-301, 302; PPHB-331, 332; PPHB-401)

Class 1, Credit 4

PPHB-351 Basic Photomicrography
Registration #0901-351

The course is a concentrated basic introduction to the principles of microscopy, photo micrography, and microtechnique with lectures, demonstrations, and projects. Morning lectures are followed by an extensive hands-on lab for the remainder of the day. The labs are practical applications of the topics discussed in lecture.

Class 5, Lab 30, Credit 4 (SR)

PPHB-401,402 Advanced Photography in Biomedical Communications
Registration #0901-401,402

Sophisticated and creative applications of photography serving the needs of the scientific community. Students explore a variety of specialized photographic techniques and a variety of philosophies. Assignments are performed which are similar to those encountered in biomedical and research institutes. (PPHB-303; basic color course)

Class 2, Lab 6, Credit 4

PPHB-415 AV Production I
Registration #0901-415

Design, creation, and presentation of 35mm slide and 35mm slide/tape productions as applied to medical and scientific needs. Planning, researching, scripting, production, revision, evaluation. Dissolve programming; graphics; combination of music, words, and images. For biomedical photography majors only. (Strong still photography background)

Class 2, Lab 4, Credit 4

PPHB-421 Scanning Photomacrography
Registration #0901-421

Scanning photomacrography is a technique that provides a universal depth of field in a photomacrograph while simultaneously producing an isometric projection. Students will learn the principles and applications of this technique, producing images of exceptional clarity in black and white as well as color. The precise and often unique disciplines required to make these images prepare the students for other scientific photographic tasks as well as fulfill an existing need for scanning photomacrographs in the biological sciences. (PPHB-301, 302; PPHB-331, 332; PPHB-401)

Class 1, Critique 1, Lab 6, Credit 4

PPHB-425 Producing Audiovisual Presentations I
Registration #0901-425

Students develop slide-tape presentations in order to communicate an idea or to change the attitudes or behavior of the viewer. The development process includes: analyzing the needs of clients and audiences; preparing communications objectives; preparing treatment, storyboard, and script; producing audio track and visual materials; synchronization and presentation preparation. Project required. (Photography skills required; for non-majors)

Credit 4

PPHB-430 Computerized Presentation Graphics
Registration #0901-430

The course introduces the student to the current technology of presentation graphic production. The development of high-quality presentation is an essential skill for the future visual media specialist. With the use of state-of-the-art computer graphics stations, the student will be able to produce 25mm film recorded slides, overhead transparencies, color prints, and B & W stats for use in a variety of presentations. Each student also learns the basic principles of presentations so that he or she has a basis for making visual presentation-related decisions. (Third- or fourth-year status or permission of instructor)

Class 2, Lab 4, Credit 4

PPHB-501,502,503 Photo Concentration
Registration #0901-501,502,503

Investigating, planning, organizing and producing an audiovisual presentation, a learning package or an informational program for a biomedical communications client. (Completion of biomedical photographic communications AAS degree requirements; at least one upper-division photo elective in media; permission of the instructor)

Class 2, Lab 8, Credit 4

PPHB-551,552,553 Special Topics in Photography
Registration #0901-551,552,553

A seminar approach offered on demand when adequate numbers of students and faculty desire to investigate specialized topics not normally offered in the regular curriculum. Available to upper-level students.

Credit variable

PPHB-599 Independent Study
Registration #0901-599

A student-proposed advanced project sponsored by an instructor. Approval of the proposal by the department chairperson and the director of the school. Available to upper-level students with a GPA of 3.0 or greater.

Credit variable

Film/Video

PPHF-199 Film/Video Freshman Seminar
Registration #0902-199

The subject of this course is the film/video freshman. Filmmaking is a collaborative effort: before filmmakers can work creatively with others, they must understand themselves and group dynamics. The course involves exercises in team building, personality testing, practice critiques, diversity, values discussions, and career review with working filmmakers.

Class 2, Credit 2
PPHF-201 Film Production I
Registration #0902-201
A fundamental course in film production. Filmmaking as a means of interpretation and expression. A combined theoretical/practical approach to media continuity. Production will be in Super 8 (non-sync) format. Students furnish film, tape and processing. Equipment is furnished by the department.
Class 3, Lab 4, Credit 5

PPHF-202 Film Production II
Registration #0902-202
A fundamental course in narrative film production. Filmmaking as a means of interpretation and expression with emphasis on the narrative. A combined theoretical/practical approach to the film medium. Production will be in super 8 (non-sync) format. Students furnish film, tape and processing. Equipment is furnished by the department.
Class 3, Lab 4, Credit 5

PPHF-204, 205, 206 History and Aesthetics of the Moving Image
Registration #0902-204, 205, 206
A non-scholarly exploration of the history and aesthetics of film. Emphasis is on determining the unique characteristics of the medium, how those characteristics are used as a means of interpretation and expression, and their relevance to other kinds of non-verbal image making. (Must be at least a second-year student)
Class 3, Credit 3

PPHF-207 Introduction to Portable Video I
Registration #0902-207
A basic course for novices. Emphasis is on videotaping and the use of the medium as an interpretive and expressive medium. A combined theoretical/practical approach to the dynamics of the medium.
Two short video projects are required. 1/2" beta equipment, including editing facilities, is provided by RIT. Students must purchase a minimum of two 60-minute, 1/2" video cassettes.
Class 3, Lab 3, Credit 4 (F, W, S)

PPHF-208 Introduction to Portable Video II
Registration #0902-208
In this course the student applies the basic video skills acquired in PPHF-207 to the design and realization of mature narrative imagery. Progress is supervised by the instructor through regular screenings and conferences with the student. (PPHF-207)
Class 3, Lab 3, Credit 4 (W)

PPHF-210 Materials and Processes of the Moving Image I
Registration #0902-210
This course is primarily designed to familiarize students with the basic technical concepts of filmmaking. By taking this course, students should gain an understanding of the technical procedures required to commit an image to the medium of film in a professional manner.
Lec. 1, Demo. 2, Credit 2 (F)

PPHF-220 Creative Processes I
Registration #0902-220
An examination of the various creative approaches necessary to bring an initial idea to the screen. There is an emphasis on appreciating the differences of individual creativity. The course exposes the student to various methods of organizing and articulating approaches to the creative problems of film making.
Class 2, Credit 2

PPHF-221 Creative Processes II
Registration #0902-221
A discipline specific follow-up to the more general theories of PPHF-220. The course varies in its approach from year to year, i.e., one year it may take the whole quarter to study one film. (PPHF-220)
Class 2, Credit 2

PPHF-250 Introduction to Film (non-majors)
Registration #0902-250
A fundamental course in film production for non-film majors. Filmmaking as a means of interpretation and expression. A combined theoretical/practical approach to media continuity. Production will be in Super 8 (non-sync) format. Students furnish film, tape, and processing. Equipment is furnished by the department.
Class 3, Lab 4, Credit 4

PPHF-310 Materials and Processes of the Moving Image II
Registration #0902-310
A technical survey of the tools and materials used in video production. (PPHF-210, PPHF-202)
Lec. 2, Credit 2 (F)

PPHF-311 Portable Video Production
Registration #0902-311
An examination of the practical, technical and aesthetic considerations of portable video production. Work involves single system 3/4" shooting and editing. Skills are developed in visual continuity, storyboarding, graphics, camera work, lighting, sound and off-line insert editing. Viewings and discussion of student work, application workshops, outside readings and viewings supplement lecture presentation and production work. (PPHF-202, 208)
Class 2, Lab 4, Credit 4 (F)

PPHF-312 Documentary and Multi-Camera Video
Registration #0902-312
In addition to continuing the documentary work of the first quarter, lab meetings will introduce and develop real-time television skills. This includes the scripting, staging and directing of a multi-camera unedited production. Lectures include broadcast history, ratings, cable and satellite television along with additional viewings and discussions of documentary work. Each student will produce a studio interview show as well as a "mini-documentary." (PPHF-311)
Class 2, Lab 4, Credit 4 (W)

PPHF-321 Writing for Film and Video I
Registration #0902-321
This course explores the writing of non-fiction and fiction for theatrical and non-theatrical films and television. Experience in the writing of fiction concentrates on the elements of dramatic construction. The exploration of non-fictional writing examines information gathering techniques and methods of investigation. Both non-fiction and fiction are treated as expository, storytelling forms. Students are responsible for writing film or television scripts on subjects of their own choosing and for completing several brief written exercises in areas such as character, dialogue, the interview, suspense, and plot. Although this course is designed primarily to meet the needs of film and television majors, it is not restricted to those students.
Class 2, Lab 3, Credit 3 (W)
Class 3, Credit 3

PPHF-322  
Writing for Film and Video II  
Continuation of PPHF-321. (PPHF-321 or consent of instructor)  
Class 2, Lab 3, Credit 3 (S)

PPHF-324  
Introduction to Animation and Graphic Film Production I  
An introduction to the techniques and practices of graphic and animated film production. This course provides training and practical experience in a wide variety of approaches to single frame motion picture production. Students produce a number of short film exercises utilizing both existing and original artwork. Some techniques covered in the course are: direct modification of the film surface, cell, ink, and paint animation, and kinestasis. Screenings of professionally made films will illustrate each technique. Proficiency in drawing is required. No prerequisites.  
Class 3, Lab 2, Credit 4 (F)

PPHF-325  
Introduction to Animation and Graphic Film Production II  
A continued introduction to the techniques and practice of graphic and animated film production. This course provides training and practical experience in a number of approaches to single frame filmmaking in addition to those covered in PPHF-324. Some techniques covered in the course are: three-dimensional animation; optical printing; computer animation; and hand-drawn sound. Screenings of professionally made films will illustrate each technique. Proficiency in drawing is not required. (PPHF-324)  
Class 3, Lab 2, Credit 4 (W)

PPHF-326  
Animation and Graphic Film Production  
This course provides practice in all phases of single frame film production. Students produce a 16mm 60-second film with sound utilizing one or more techniques learned in the preceding two quarters. (PPHF-325)  
Class 3, Lab 2, Credit 4 (S)

PPHF-350  
Directing the Actor for Film and Video  
A course in basic directorial techniques with emphasis on the special problems peculiar to film and video production. Class meetings are organized around the presentation of scenes prepared by student directors.  
Studio 4, Class 1, Credit 3

PPHF-404  
Senior Project Seminar  
A required course for third-year film/video majors and the prerequisite for PPHF-541, Senior Project. Students will discuss and generate a written plan for their senior film and/or video projects and will select an advisor from among the film/video faculty. (PPHF-412)  
Class 1, Credit 1 (S)

PPHF-405  
Advanced Video Production  
A thorough survey of the state-of-the-art methods and the hardware involved with electronic imaging. Large format computer editing and field recording, digital frame grabbing and store, computer imaging and animation are some of the topics covered. (PPHF-313, PPHF-310)  
Class 3, Credit 3

PPHF-410  
Materials and Processes of the Moving Image III  
The course introduces the student to 16mm film technology and production systems that apply to other media production as well. (PPHF-202, 310)  
Class 1, Lab 2, Credit 2 (F)

PPHF-411  
Introduction to Synchronous Film Production  
An introduction to all aspects of professional film production. Students produce short projects while learning basic shooting and editorial procedures and equipment handling and maintenance.  
Class 3, Lab 4, Credit 5

PPHF-412  
Narrative Film Production I  
An advanced class in filmmaking. Students plan and shoot a 16mm film project to be edited and completed during the spring quarter, PPHF-413. (PPHF-411)  
Class 3, Lab 4, Credit 5

PPHF-413  
Narrative Film Production II  
Students edit, mix sound and complete the 16mm project begun in PPHF-412. (PPHF-412)  
Class 3, Lab 4, Credit 5

PPHF-420  
Sound Recording  
Specialized information and work in sound to give information and lab work beyond the regular course and to encourage the beginning of vocational level work in sound. Each student prepares a mixed sound track to professional quality standards.  
Lec. 1, Lab 2, Credit 3 (F)

PPHF-427  
Microcomputer Animation I  
This course provides an introduction to animation created through the use of a digital computer, rather than with traditional motion picture techniques. A survey of various computer animation hardware/software combinations precedes actual production of animated sequences, both with and without sound, which are then recorded on computer disk, motion picture film, or video. (PPHF-324)  
Class 2, Lab 4, Credit 4 (W)

PPHF-428  
Microcomputer Animation II  
This course provides practice in microcomputer animation. Students produce a finished animated project on film or videotape with sound. Emphasis is placed upon various post-production strategies which involve such techniques as combining computer animation with live action, the addition of film and video special effects, and combining computer animation with existing film or video imagery. (PPHF-427)  
Class 2, Lab 4, Credit 4 (S)

PPHF-430  
Advanced Sound Recording  
Continuing the work in PPHF-420 to include the decision level in the employment of various sound equipment and including more complex work in multi-track recording and mixing. (PPHF-420 or permission of instructor)  
Class 2, Lab 2, Credit 3
PPHF-434 Advanced Video
Registration #0902-434
A thorough survey of the state-of-the-art methods and the hardware involved with electronic imaging. Large format computer editing and field recording, digital frame grabbing and store, computer imaging and animation are some of the topics covered. (PPHF-202, 310)
Class 3, Credit 3

PPHF-435 Advanced Scriptwriting
Registration #0902-435
A seminar in advanced scriptwriting. Problems related to structure, character development, dialogue, rewriting, cultural conventions, genre, and style are discussed in detail while students work on a major writing project. (PPHF-322)
Class 2, Discussion 4, Credit 4 (W)

PPHF-442 Film/Video Internship
Registration #0902-442
This course is designed to provide the students with on-the-job experience in the field of film/video. The student will seek and acquire a school-approved internship position in a business or industry. The working environment will provide the forum for learning more about the student's chosen career. A final interview with the internship coordinator will assist the student in evaluating the experience. The coordinator should be the faculty member most familiar with the student's internship field. (Permission of internship coordinator)
Credits 1-6/Qtr. (F, W, S)

PPHF-541 Senior Production I (Film/Video)
Registration #0902-541
Continuation of the introduction to business and legal factors begun in the basic film and video production activities. The course assists the student in detailed budgeting and shooting, script preparation and breakdown. Final project shooting begins this quarter. (PPHF-413)
Class 1, Lab 6, Credit 6 (F)

PPHF-542 Senior Production II (Film/Video)
Registration #0902-542
Continuing the senior project shooting phase to completion. Production teams meet as sections with faculty whose experience matches the kind of production involved. (PPHF-541)
Class 1, Lab 6, Credit 6 (W)

PPHF-543 Post Production (Film/Video)
Registration #0902-543
Completion of senior projects. Includes a review of post-production techniques. (PPHF-542)
Class 1, Lab 6, Credit 4 (S)

PPHF-599 Independent Study
Registration #0902-599
A student-proposed advanced project sponsored by an instructor. Approval of the proposal by the department chairperson and the director of the school. Available to upper-level students with a GPA or 3.0 or greater.
Credit variable (F, W, S)

Professional Photographic Illustration

PPHL-200 Photography I-PPHL/PPHA
Registration #0904-200 (Summer transfer)
An intensive 10-week summer course for students entering the transfer program in Professional Photographic Illustration. This is the minimum photographic education needed to gain entry to second-year standing and replaces PPHL-201, 202, 203. Since this course is such an intensive offering, previous photographic experience is highly advisable.
Class 10, Lab 20, Credit 12

PPHL-201, 202, 203 Applied Photography I
Registration #0904-201,202,203
An introduction to the major in Applied Photography which will give the student broad experience in various areas of photography, to assist in making vocational decisions and understanding visual communications. The curriculum emphasizes both craft and visual problem solving during the first two quarters. The third quarter continues the attitudes of the previous quarters and allows the student to concentrate in an area of interest from an offering of courses established by the department.
Class 4, Studio 4, Lab 4, Credit 7

PPHL-205,206 Creative Problems
Registration #0904-205, 206
This course is designed to make students aware of their own creative problem solving potential. Emphasis is placed on students’ personal environments, enthusiasms and experiences. Attention is given to individual thinking and seeing. This will be accomplished through lectures and individual group assignments.
Class 3, Credit 3

PPHL-207 Introduction to Color
Registration #0904-207
A one-quarter course introducing color as a new element in making photographs. The course will offer a theoretical, technical and aesthetic foundation in color photography. The student will gain familiarity with the materials through shooting assignments. Emphasis will be placed on developing printing skills.
Class 2, Lab 4, Credit 3

PPHL-220 Studio Light
Registration #0904-220
A lighting workshop course that uses visual exercises to teach students how to evaluate light conditions outside and control and reproduce those conditions in the studio. (PPHL-201, 202)
Class 2, Critique 2, Studio 4, Lab 4, Credit 5
This course will consider ideas and modes of thinking that can influence the creation of pictures. It is designed around several thematic issues that will allow the students to personally and creatively resolve visual problems associated with personal culture and history; photographic and non-photographic images; integration of aesthetics, ethics, and values; ways of working; and discipline, structure, and inspiration. Students will be encouraged not only to think about pictures in a larger context, but also to consider their personal relationships with the act of making photographic images.

Credit 5

PPHL-225 Visual Inquiry
Registration #0904-225
Where do ideas come from, and how do you help them along? How do you solve visual problems, assignments, questions, curiosities? What is your method for coming up with unique visual solutions? This class is for those who like to write and trace ideas and their evolution. A journal will be used as a forum for drawing, writing, collages, photographs, and other things. We will analyze the process we take in order to solve problems (visual and other types). We will start with simple posed questions (curiosities) and evolve them into useful solved answers (photographs).

Credit 5

PPHL-226 The Spiritual/Mystical Image
Registration #0904-226
The objective of this course is to guide the student toward a tangible perception of a higher self that is compatible with our established perceptions of ourselves as artists. Three major areas to be integrated are self, intellect, and spirit. Emphasis on realist and contemporary possibilities and self-discovery through imagination.

Credit 5

PPHL-227 Problems & Projects in Still Life: a Collaboration
Registration #0904-227
The primary focus of this course is the still life as a medium for creative expression and visual experimentation. The tools and techniques particular to the still-life photographer will be investigated and demonstrated. The special manipulations possible—choice of lighting, perspective, camera angle, surface propping, set rigging, multiple exposure, front projection, and other esoteric techniques—will be discussed, demonstrated, and applied to assignments. Projects will be in a practical vein, relating to actual typical problems that are part of a working studio's daily life. Assignments will investigate the overlapping relationships of fine-art, editorial, and commercial still-life photography. Large- and small-format cameras may be used; assignments will be done both in and out of the studio.

Credit 5

PPHL-300 Photography II, BFA Transfer
Registration #0904-300
A concentrated 10-week summer course for students entering the transfer program in photographic illustration. Students must have had previous photography, design and an AAS degree (or its equivalent) from another institution. All selections will be verified by portfolio. This course is designed for exclusive admission to the complete third/fourth-year BFA program.

Credit 15 (SR)
PPHL-326  
**Photojournalism for Newspapers**
Registration #0904-326
This course is for students in or curious about a career in newspaper photojournalism. The content will be both theoretical and practical. Students will be required to shoot according to newspaper standards and needs on a weekly basis. In addition, students will have the opportunity to "shadow" photographers and editors from the Gannett Newspapers. Shooting sports, spot news, features, and special essays will be part of the course. Special processing and printing skills will be covered as well as specialized camera and lens handling techniques. This is an excellent opportunity for those seeking to improve portfolio for newspaper internship possibilities. (Permission of instructor)
Credit 5

PPHL-327  
**Picture Editing and Layout Design**
Registration #0904-327
A course about image selection, usage, and design for the printed page. Using images from sources other than your own photographs, we will discuss picture selection relative to context and desired impact and how to effectively design the page(s) upon which the image(s) exist(s). Techniques such as scalping, proportion, and sizing will be related to page design. We will discuss typography and its function with photos, including captions and block text. Students will lay out a number of assignments from single pages to essays of varying length. A variety of picture sources will be used. A student need not use his/her photos in this course. (Second-, third-, or fourth-year status)
Credit 5

PPHL-330  
**Art Direction & Copywriting**
Registration #0904-330
A study of art direction and copywriting with emphasis on conceptual thinking as it applies to the photographic image. Some emphasis will be placed on basic hand skills, i.e.; layout, type rendering, and paste-up. Marketing principles and career possibilities will be covered. (Photo student or permission of instructor)
Credit 5

PPHL-340  
**Narrative/Documentary Workshop**
Registration #0904-340
A major course in photojournalism and editorial photography. Emphasis will be placed on the development of intuitive photographic responses.

The objective of this five-week workshop will be to orient as well as challenge the students to photographically explore the nature of their subject matter and to visually communicate in a contemporary editorial spirit those responses and feelings to daily and weekly assigned projects that will be made in color slides and black-and-white prints.

A majority of these projects will be photographed on location throughout western New York and perhaps other not so distant environments including NYC. The educational direction of the workshop will be to visually explore photographic attitudes in approaching and solving photographic/photojournalism problems. The historic and aesthetic nature of photojournalism through documentation, recording, and personal responses will be applied as well as discussions through slide presentation and lecture on the nature of editorial magazines in the United States, Europe, and South America.

Critiques will be held after each project is edited and presented, enabling the student to obtain direct feedback from his peers and the instructor. The eagerness to learn, work hard, explore, and care is very important.

Students will be expected to furnish their own 35mm cameras and supplies. Several publications may be used.

This course may be used by BFA photo students for major credit. Limit 12 students.
Credit 8 (SR)

PPHL-350  
**Advanced Still Life**
Registration #0904-350
This course introduces the student to advanced concepts of visual communication and studio techniques. Students will be encouraged to work on projects in which they have a significant interest. Assignment content will be open to student input. Work will be shown to various audiences for criticism and experience. Evaluation of these criticisms will be an important part of the experience. The tools and techniques of studio still-life photography will be discussed and demonstrated as appropriate. (Photojournalism I or Advertising I or permission of instructor)
Class 2, Critique 2, Studio 5, Credit 5

PPHL-400  
**Conceptual Photography**
Registration #0904-400
A concentrated upper-division course designed to develop a student's ability to approach problems in a unique and fresh manner. Major emphasis will be placed on thinking through a problem from concept to final execution. Work will be done both in studio and on location. During morning sessions, concepts will be discussed. The students will present photographic solutions to those ideas that have occurred to them. Each concept will then be evaluated by the faculty and students: the faculty will point out problems the students will encounter in executing successful solutions. The class will be expected to participate in this exchange of ideas. Prerequisite: designed primarily for students in upper-division applied programs who have had two (2) years of photographic experience or its equivalent. This course presupposes a working knowledge of color, black-and-white, and studio experience. Registration is limited to eighteen (18) students. May be used by BFA students for major credit.

Credit 15
PPHL-416, 417, 418  
Registration #0904-416, 417, 418  
Photojournalism I  
This course will explore the use of the photographic image in narrative, documentary and editorial form. The emphasis of the course will allow the students a variety of experiences. There will be emphasis on publication and public need. (PPHL-313)  
Class 4, Field 5, Credit 4 (F, W)  

PPHL-434  
Registration #0904-434  
Advertising Illustration  
A course built strictly to the standards of professional photography. Only those students who seriously aspire to be professional craftspeople should enroll. The assignments are specific and vary from strictly commercial to advertising illustration. In addition, the student is encouraged to specialize in the direction of his or her own natural ability and interests. Approximately 2/3 of the photography will be in color. (PPHL-443)  
Lec. 1, Critique 2, Studio 6, Credit 4 (F)  

PPHL-437, 438, 439  
Registration #0904-437, 438, 439  
Visual Communications Workshop  
Primarily a photographic course; however, emphasis is placed on experimental approaches to communications. Visual and psychological purposes of media will be explored. This course presupposes a basic background in design, as well as in photography.  
Class 2, Lab 8,* Credit 4  
*Lab hours may not be scheduled and are to be completed in available time.  

PPHL-441, 442, 443  
Registration #0904-441, 442, 443  
Advertising Photography I  
A course in visual problem solving with photography. Studio and other controlled environments are stressed. Advertising and editorial solutions and applications are explored. The skills involved with both product rendering and concept illustration will be covered. (PPHL-313)  
Class 4, Studio 5, Credit 5  

PPHL-451, 452  
Registration #0904-451, 452  
Portrait Photography I & II  
The lecture period is devoted to discussion of the current portrait project and its problems, to lighting demonstrations, posing and draping models, composition and make-up. Basic, advanced, contemporary lighting is stressed, with a special emphasis on more advanced repeatable lighting techniques. Professional quality portraits are analyzed for lighting and finishing, as well as composition. Students are encouraged to orally analyze their own work and their shortcomings.  
The studio period allows students the opportunity to work on projects under the supervision of the instructor. Students also are encouraged to create something beyond the basic project and to choose the proper models for the project. Students are taught to "see the lightings," and are permitted to use either mazda or speed lighting. These "lightings" are very adaptable to commercial, illustration, and fashion photography. Professional quality is required throughout the course. Work of inferior quality will not be accepted. (PPHL-313 or equivalent)  
Class 3, Studio 2, Credit 4 (F, W)  

PPHL-453  
Registration #0904-453  
Advanced Portrait Photography  
This course brings together the skills of the first two terms and encourages the student to develop a personal approach to portrait photography through a term-long, self-directed project. (PPHL-452 or equivalent)  
Lec. 2, Studio 4, Credit 4 (S only)  

PPHL-455  
Registration #0904-455  
Studio Photo/Still Life  
A summer session course in visual problem solving with photography, emphasizing still-life techniques. Studio and other controlled environments are stressed. Advertising and editorial solutions and applications are explored. The skills involved with both product rendering and concept illustration will be covered. Students may enroll in this course and PPHL-456 together, as an alternative for PPHL-441, 442, 443 (with department chairperson's approval; note that this is two credits less than PPHL-441, 442, 443) or take one or both sessions as photo electives. (PPHL-313 or equivalent)  
Credit 7 (SR)  

PPHL-456  
Registration #0904-456  
Studio Photo/People  
A summer session course in visual problem solving with photography, emphasizing people in the studio. Studio and other controlled environments are stressed. Advertising and editorial solutions and applications are explored. The skills involved with both product rendering and concept illustration will be covered. Students may enroll in this course and PPHL-455 together, as an alternative for PPHL-441, 442, 443 (with department chairperson's approval; note that this is two credits less than PPHL-441, 442, 443) or take one or both sessions as photo electives. (PPHL-313 or equivalent)  
Credit 7 (SR)  

PPHL-461  
Registration #0904-461  
Studio Operations  
A one-quarter business course for all photography school students. This course will cover basic business concepts necessary for the operation of a small studio or free-lance business on a practical level. Job hunting, self-promotions, business promotions, bookkeeping, and legal aspects of business will be addressed.  
Class 2, Lab 2, Credit 4  

PPHL-462  
Registration #0904-462  
The Personal Document  
A combination studio and location class that introduces the student to the concepts of using personal experience and lifestyle as information and inspiration towards image making and taking. A variety of issues will be dealt with such as public and personal events, cultural, social, personal and intercultural symbols. The course will cover the written word and its effect and influence on the photograph, and advanced black-and-white printing. Layout and presentation, and their effect on the audience the work is designed to serve will be included. (PPHL-313, or permission of instructor)  
Credit 7 (SR)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPHL-463</td>
<td>Introduction to Electronic Photography</td>
<td>5</td>
<td>Hands-on activities will permit each student to discover the applications of electronic photography. In addition to studio/location/laboratory exercises, there will be presentations on the basics of the technologies in use, inter-disciplinary integration of the communications and graphic arts fields, and an introduction to &quot;hard copy&quot; output devices. Students will be expected to capture images using both still video and silver halide cameras, digitize selected images, process digital images, create picture files, and participate in the creation of a class electronic project.</td>
</tr>
<tr>
<td>PPHL-465</td>
<td>On Location Photography</td>
<td>5</td>
<td>This course will cover the techniques and equipment necessary to complete an &quot;on location&quot; assignment for a corporate report, brochure, or audiovisual presentation. Students will be encouraged to meet professional standards while developing a strong personal point of view. (PPHL-313 or equivalent)</td>
</tr>
<tr>
<td>PPHL-470</td>
<td>Environmental Portraiture</td>
<td>6 (SR)</td>
<td>A course involving the selection of various persons as subjects and learning of their skills and specialties. The student will interview subjects, define what they do and where they do it, and design a photograph that shows the viewer the subject's job or avocation and the environment in which the subject operates. (PPHL-313 or equivalent)</td>
</tr>
<tr>
<td>PPHL-472</td>
<td>Studio Skills (Non-studio majors)</td>
<td>4</td>
<td>A general studio course for non-advertising majors. Topics include working with light, selection of lenses, advertising concepts, and working with other people's direction. Basic skills in large format cameras and studio lighting expected. (Third- or fourth-year status, non-advertising majors)</td>
</tr>
<tr>
<td>PPHL-473</td>
<td>Picture Researching</td>
<td>5</td>
<td>An introductory course surveying current practices, procedures, techniques, and resources employed in picture researching for collections, exhibitions, publications, motion pictures, and television. Students explore the ways pictures are used in communications, establish what pictures are needed for specific projects, discover how they may be found (or produced), and make arrangements to obtain reproduction rights. A case history in picture researching and a personal picture researching project will be produced by each student. (Third- or fourth-year status)</td>
</tr>
<tr>
<td>PPHL-474</td>
<td>Food</td>
<td>5</td>
<td>Instruction covers basic means and methods of preparing a food photograph: shopping for the proper ingredients; consultation and working the prop and food stylists/chefs/home economists; how the approach to a food photograph differs from other photographic assignments. Students learn the basic methods of preparing food for photography as opposed to food for eating. Assignments will range from simple raw ingredient shots to pour shots to building a sandwich to making a salad. (Third- or fourth-year status)</td>
</tr>
<tr>
<td>PPHL-478</td>
<td>Senior Thesis/Photo &amp; Design</td>
<td>5</td>
<td>A course to bring together graphic design and photography students. The students will be expected to create a small campaign on a subject of their choice. The purpose of the course is to establish a collaborative atmosphere between the two groups and to introduce them to the process of work on the outside. Teams will set up during the sixth or seventh week of the winter quarter. Enrollment will be limited. (Fourth-year status and permission of instructor)</td>
</tr>
<tr>
<td>PPHL-516,517,518</td>
<td>Photojournalism II</td>
<td>5, 5, 5</td>
<td>This course will explore and expand the use of the photographic image in the narrative/documentary and editorial point of view. Emphasis will be upon publication and professional use of the image. (PPHL-418)</td>
</tr>
<tr>
<td>PPHL-535,536</td>
<td>Advanced Color Seminar</td>
<td>5, 5</td>
<td>This is a portfolio preparation course. It concentrates on the shooting, structure, and presentation of a body of work. Completion of a four-part thematic assignment and three individual photographic assignments are required. All assignments are non-specific in nature, allowing the student the freedom of his or her own direction. As part of the course requirements, each student will choose an appropriate portfolio format and will begin to show a portfolio. (Fourth-year standing or instructor's permission; PPHL-443, 418 or instructor's permission)</td>
</tr>
<tr>
<td>PPHL-541,542,543</td>
<td>Advertising Photography II</td>
<td>5, 5, 5</td>
<td>A course that brings together the artistic and technical input of the first three years of the program and directs the student towards the application of the acquired skills through a series of professionally oriented assignments. (PPHL-443 or equivalent)</td>
</tr>
<tr>
<td>PPHL-551</td>
<td>Special Topics</td>
<td>5</td>
<td>Advanced topics of current or special interest, varying from quarter to quarter, selected from the field of professional photographic illustration. Special topics announced in advance. (Not offered every quarter. Consult coordinator of the Professional Photographic Illustration Program.)</td>
</tr>
<tr>
<td>PPHL-480</td>
<td>Propaganda and Photography</td>
<td>5</td>
<td>PROP-A-GAN-DA, N. The particular doctrines or principles propagated by an organizational or concerted movement. The dissemination of information from a particular point of view. The examination of photographs and films that have very often shaped our view of the world. The positive and negative effects of such images. The period from the Crimean War to the present will be covered. Special emphasis will be placed on World War II, where propaganda was used in the extreme for both good and evil. Still photographs, including those in the professor's collection, will be studied, some of which are &quot;faked&quot; photographs. A larger question to be studied is &quot;Why were these photographs faked?&quot; Included in lectures will be the historical and cultural forces behind the work. (No prerequisites)</td>
</tr>
<tr>
<td>PPHL-460</td>
<td>Senior Thesis/Photo &amp; Design</td>
<td>5</td>
<td>A course to bring together graphic design and photography students. The students will be expected to create a small campaign on a subject of their choice. The purpose of the course is to establish a collaborative atmosphere between the two groups and to introduce them to the process of work on the outside. Teams will set up during the sixth or seventh week of the winter quarter. Enrollment will be limited. (Fourth-year status and permission of instructor)</td>
</tr>
</tbody>
</table>
PPHL-599 Independent Study
Registration #0904-599
A student-proposed advanced project sponsored by an instructor. Approval of the proposal by the department chairperson and the director of the school. Available to upper-level students with a GPA of 3.0 or greater.
Class, Credit variable

Photo Systems Management

PPHM-310 Survey of Production Processing and Finishing
Registration #0905-310 Provides the non-photographic processing and finishing major with an opportunity to become knowledgeable in the operational procedures and services of a processing and finishing laboratory. (PPHM-203)
Class 2, Lab 3, Credit 2 (S)

PPHM-315,316 Electronics I, II
Registration #0905-315,316 Circuits using DC and AC sources are analyzed. Components stressed are the resistor, diode, transistor, capacitor, inductor, and transformer, SCR, Triac, and AC and DC motors. Analog and digital circuits are analyzed. Computer hardware will be covered. The application of above principles to photofinishing equipment will conclude the course.
Class 3, Lab 2, Credit 4 (F, W)

PPHM-401 Photo Process Control
Registration #0905-401 Analytical methods of studying photographic processes; methods of obtaining data about processes, including chemical and physical factors; methods of making process adjustments, including automatic control methods.
Class 2, Lab 6, Credit 4 (F)

PPHM-420 Applied Statistical Quality Control
Registration #0905-420 The basic concepts of quality control and the role of applied statistics are addressed using examples from the photographic and graphic arts industries. Examples will include the use of such statistical tools as process capability studies, conformance to specification analysis, control charts, and attribute and acceptance sampling plans, as well as the use of nonparametric techniques for the subjective evaluation of image quality. Although many of the topics covered are statistically based, attention is given to the ingredients necessary for a successful company-wide quality control program.
Class 2, Lab 2, Credit 3

PPHM-440 Basic Photo Lab Operations
Registration #0905-440 A 10-week summer course that provides an opportunity for students of disciplines other than photography or business to gain an understanding of all aspects of the modern photo laboratory. Course is organized to allow the student to take Materials and Processes of Photography (PPHT-210) concurrently.
Class 6, Lab 18, Credit 12 (SR)

PPHM-441,442,443 Basic Photo Lab Operations I, II, III
Registration #0905-441,442,443 An introduction to the concepts of automated film processing, in black-and-white and color. Theoretical concepts of film processing as well as practical production concepts will be explored and practiced in the laboratory. The concepts of semi-automatic production printers, their set-up, production control, and operation will be practiced in a production environment. The flexibility and capability of enlargers for use in custom production will be covered, along with the production of duplicate slides and internegatives.
Class 2, Lab 6, Credit 4 (F, W, S, SR)

PPHM-521,522 Advanced Photo Lab Operations I, II
Registration #0905-521,522 This two-course sequence offered during the senior year gives the student the opportunity to become familiar with the operation and control of automated photo processing equipment in a production environment. The course will also include the training and supervision aspects of operating a photo processing installation. (PPHM-440, PPHM-443)
Class 2, Lab 6, Credit 4 (F, W, S, SR)

PPHM-525 Photo Lab Management
Registration #0905-525 This course is designed to provide the student with the background knowledge necessary to plan, set up, and operate a photo processing laboratory. Included in this course will be a study of production methods, work flow, equipment, and personnel utilization. Production line costing methods will be discussed, along with monitoring procedures for quality, waste, and cost control. (Permission of the instructor)
Class 4, Credit 4 (S)

PPHM-530 Photo Lab Materials
Registration #0905-530 This senior-year course offers the student the opportunity to study the factors that go into the refurbishing or building of photo processing installations. The maintenance of equipment no longer manufacturer-supported will also be covered. (PPHM-441, 442, 443)
Lab 2, Credit 2 (F, W, S)

PPHM-551,552,553 Special Topics in Photographic Processing and Finishing Management
Registration #0905-551, 552,553 A seminar approach offered on demand when adequate numbers of students and a faculty member agree to study a subject not normally offered.
Credit variable

PPHL-599 Independent Study
Registration #0905-599 A student-proposed advanced project sponsored by an instructor. Approval of the proposal by department chairperson and director of the school.
Credit variable
Imaging and Photographic Technology

PPHT-200

Photography I-PPHT/PPHB
Registration #0920-200
An intensive 10-week summer course for students entering the transfer programs in biomedical photographic communications and photographic technology. This is the minimum photographic education needed to gain entry to second-year standing and replaces PPHB-201, 202, 203 and PPHT-201, 202, 203. Since this course is such an intensive offering, previous photographic experience is highly advisable.
Class 10, Lab 20, Credit 12

PPHT-201,202,203

Photography I
Registration #0920-201,202,203
A study of the fundamentals of photography with emphasis on the development of the needed creativity, craftsmanship, theory and visual communications to undertake advanced study in the medium. The theory and technical aspects are taught as they relate to solving photographic problems.
Class 4, Studio 4, Lab 4, Credit 7

PPHT-205

Photography for Non-Photo Majors
Registration #0920-205
A course in basic photographic techniques for non-photography students. The material will assist the student in understanding the controls of light and film. Emphasis is placed on the use of photography in the student's career field. A 35mm camera is required.
Class 4, Credit 4

PPHT-210

Materials and Processes of Photography
Registration #0920-210
An intensive 10-week summer course for students entering a transfer program in Biomedical Photographic Communications or Imaging and Photographic Technology. This course replaces PPHT-211, 212, 213. (Either this course or the PPHT-211, 212, 213 sequence is also a requirement in the Professional Photographic Illustration Program.)
Class 9, Credit 6 (SR)

PPHT-211,212,213

Materials and Processes of Photography
Registration #0920-211,212,213
Basic study of the technology of photography, with the emphasis on applications to real photographic problems. Among the topics studied are image formation and evaluation, photosensitive materials, exposure, processing, tone reproduction, visual perception, color theory, variability, quality control, and photographic effects. An approved independent study project is required.
Class 3, Credit 3

PPHT-220, 221

Survey of Imaging and Photographic Technology
Registration #0920-220,221
This course is designed to provide students with information concerning career opportunities within the field of imaging and photographic technology and subdivisions of specialization, and includes presentations by experienced professionals representing a variety of positions.
Class 1, Credit 1
PPHT-312 Color Printing Theory
Registration #0920-312
This course provides an introduction to color theory and the exploration of color processes utilizing practical laboratory procedures and photographic color reproduction processes. This will support lectures and readings on applied color theory relating to both color photography and its applications. Important topics, in addition to color materials and processes, include color vision, psychological aspects of color, color terminology, and color measurement and specification.
Class 2, Lab 4, Credit 4

PPHT-313 Color Measurement
Registration #0920-313
Equipment and methods used for the measurement of color will be discussed and demonstrated in the laboratory. Topics covered include light sources, radiometry, spectrophotometry, color order systems, and reproduction of color. (PPHT-321 or equivalent)
Class 2, Lab 4, Credit 4

PPHT-321 Applied Computing for Technical Photography
Registration #0920-321
Current time-sharing computer facilities will be introduced. Introductory material on programming will be presented. Programming assignments will be required. (Limited to Imaging and Photography Technology students or by the permission of the instructor)
Class 2, Credit 3

PPHT-340 Introduction to Scientific and Technical Applications of Photography
Registration #0920-340
Introduction to special or unusual methods particularly useful in technical, scientific, or research photography. Emphasis on the student's development of innovative solutions to a set of photographic problems. Topics to include such subjects as high speed photography, strip photography, velocity and time measurement cameras, polarization, time lapse, astrophotography and others. First hand experience is encouraged by participation in simulated and simplified approaches to more complex specialties.
Class 2, Credit 4

PPHT-341 Introduction to Photography for Publications
Registration #0920-341
An introduction to the use of photography in specialized publications in science, industry, business and education. Skill-building assignments to improve competence and an introduction to the problems of the art director, editor, printer, layout person, and writer form the basis of the course content. (PPHL-313, PPHT-312 or permission of the instructor)
Class 2, Lab 4, Credit 4

PPHT-404,405,406 Seminar in Photography for Publications
Registration #0920-404,405,406
A survey of this type of publication with particular emphasis on the photographic problems involved. Skill-building assignments to improve competence and an introduction to the problems of the art director, editor, printer, layout person, and writer form the basis of the course content. (PPHL-313, PPHT-312 or permission of the instructor)
Class 2, Lab 4, Credit 4

PPHT-408 Introduction to Scientific and Technical Applications of Photography
Registration #0920-408
Introduction to special or unusual methods particularly useful in technical, scientific, or research photography. Emphasis on the student's development of innovative solutions to a set of photographic problems. Firsthand experience is encouraged by participation in simulated and simplified approaches to more complex specialties.
Class 2, Lab 4, Credit 4

PPHT-410 Architectural Photography
Registration #0920-410
This is an image-making course for advanced students with specific interest in architectural and interior photography. Assignments are designed to emphasize the development and exploitation of professional attitudes and techniques while providing a comprehensive study of the subject. (Third- or fourth-year status or permission of instructor)
Credit 9 (SR)

PPHT-412 Photomacrography/Photomicrography
Registration #0920-412
Basic principles of photomacrography and photomicrography with major emphasis on illumination techniques and image formation, with lectures, demonstrations, and projects. (PPHT-303)
Class 2, Lab 3, Credit 3

PPHT-415 System Design for Graphic Presentations
Registration #0920-415
Study of the hardware and software needed to effectively design computer graphic images. Workstation labs will provide hands-on experience with MS-DOS and Mac computer platforms. (PPHT-203)
Class 2, Lab 2, Credit 3

PPHT-421 Holography I
Registration #0920-421
This course is intended to be an introduction to holography theory and techniques. Lectures and demonstrations will cover the materials, processes, and applications of the fundamental types of holograms. Labs will give hands-on experience with the construction and playback of transmission, reflection, and focused image hologram types. (Algebra and physics)
Class 2, Lab 4, Credit 4
PPHT-422 Applications of Holography  
Registration #0920-422  
This course is designed to give the student a range of experiences in the production and evaluation of holograms as applied to scientific and engineering problems. Instruction is given in both the theoretical and practical aspects of holographic interferometry and nondestructive testing as well as holographic optical elements, computer-generated holography and coherent optical processing. The student is expected to have previous experience in basic display holography.  
Credit 4

PPHT-424 Nature Photography  
Registration #0920-424  
Students will learn the fundamentals of professional nature photography as exhibited by such magazines as *Audubon* and *National Wildlife*. Topics include selection and care of equipment, use of strobes, adapting to adverse weather conditions, sales of photographs, copyright law, free-lancing, and more. Students will be required to spend a minimum of several hours per week shooting in natural environments. (PPHT-201, 202, 203 or instructor permission)  
Class/Critique 6, Credit 6

PPHT-425,426,427 Nature Photography  
Registration #0920-425, 426,427  
Students will learn the fundamentals of professional nature photography as exhibited by such magazines as *Audubon* and *National Wildlife*. Topics include selection and care of equipment, use of strobes, adapting to adverse weather conditions, sales of photographs, copyright law, free-lance, and more. Students will be required to spend a minimum of several hours per week shooting in natural environments. (PPHT-201-203 or permission of instructor)  
Class 4, Field 4, Credit 4

PPHT-431 Architectural Photography  
Registration #0920-431  
An image-making course for advanced students with a specific interest in interior and exterior architectural photography. Assignments are designed to emphasize the development and exploration of professional attitudes and techniques while providing a comprehensive study of the subject. All required work will be on color transparency materials. (PPHL-313, PPHT-312 or permission of the instructor)  
Class 3, Credit 9 (SR only)

PPHT-441 Introduction to Dye Transfer  
Registration #0920-441  
An introduction to the dye transfer process using pan matrix film with emphasis on the understanding of its theoretical principles, and on the mastery of basic transfer techniques. This includes the preparation of transfer prints from the student’s color negatives. (PPHT-312 or equivalent)  
Class 1, Lab 6, Credit 4

PPHT-442 Advanced Dye Transfer I  
Registration #0920-442  
A continuation of the dye transfer process with emphasis on the understanding and mastery of masking and color separation (analysis) of a color transparency. The synthesis is accomplished by the making of a dye transfer print. (PPHT-441, PPHT-312 or equivalent)  
Class 1, Lab 6, Credit 4

PPHT-443 Advanced Dye Transfer II  
Registration #0920-443  
This quarter of the dye transfer program is devoted to the variations of standard techniques and further extension of improvement of procedures. Difficulty of procedure will determine number of assignments required. (PPHT-442 or equivalent)  
Class 1, Lab 6, Credit 4

PPHT-444 Reversal Color Printing  
Registration #0920-444  
A one-quarter course on reversal color printing procedures, printing and processing. The student will gain proficiency in using reversal print material. (PPHT-312 or permission of the instructor)  
Class 1, Lab 4, Credit 3

PPHT-446,447,448 Advanced Color  
Registration #0920-446, 447,448  
This course provides advanced study in color techniques and theory in relation to quality and creative use of photographic materials. The student may choose a section for intensive study such as the dye transfer process, quality control methods in printing and processing and special masking. (PPHT-312 or equivalent and permission of the instructor)  
Lecture 1, Lab 6, Credit 4

PPHT-450 Photographic Scanning Systems  
Registration #0920-450  
The student will receive instruction and make photographs related to the ever-increasing application of scanning imaging systems in industry, especially as these relate to industrial, scientific, and technical applications. Simplified and experimental equipment will be demonstrated and used. Primary emphasis will be on demonstrating a thorough understanding of the imaging processes and controls at work in systems such as peripheral, photofinish, strip enlarging, and panoramic recording methods. (For upper-division PPHT students; others with permission of the instructor)  
Lec. 2, Lab 4, Credit 4

PPHT-460 Special Effects Photography  
Registration #0920-460  
A course designed for practicing photographers and students in which photographic effects beyond those encountered in everyday situations in illustrative, commercial and advertising photography are discussed and practiced. Among the topics to be covered are stroboscopic, peripheral, scanning, high-speed flash, matte box, and combination flash/tungsten photographic techniques. (For upper-division SPAS students)  
Lec. 2, Studio 4, Credit 4

PPHT-470 Introduction to Digital Image Processing  
Registration #0920-470  
Exploration of the technology, theory and application of digital image processing equipment and procedures, particularly in relation to photographic processes. Principles of input, output and computer processing techniques will be covered. Applications such as contrast enhancement, edge sharpening and smoothing will be included. (PPHT-210, 213, or 321)  
Class 2, Lab 4, Credit 4
This course is designed to provide students with on-the-job experience in the field of imaging and photographic technology. The student will seek and acquire a school-approved co-op position in business or industry. The working environment will provide the forum for learning more about the student's chosen career. A final interview with the co-op coordinator will assist the student in evaluating the experience.

Credit 0

This is a course in the theory and practice of photographic systems designed to permit analysis of events of very short or of extended duration. Included are operational characteristics of time-lapse cameras, sequencing and timing control devices, time magnification relationships. Also, characteristics of intermittent and rotating prism cameras, rotating mirror and drum cameras, synchronization system and timing controls and high speed flash and spark gap systems. Students gain experience not only in the use of the basic equipment but also in proper planning, set-up and data reduction techniques through a series of practical experiments. (For upper-division PPHT students; others with permission of the instructor)

Credit 9 (SR)

This course leads to a completed proposal in preparation for the Senior Project (PPHT-503). It guides the students in preparing formal proposals for their projects, including selection of topics, searching the literature, and proposal evaluation.

Credit 1

Investigation of a topic in the area of applied, technical, or scientific photography, involving camera and/or laboratory work, evaluation, oral presentation of the results, and a written report in a standard format. (PPHT-502)

Credit 3

A survey of imaging methods and imaging systems not normally encountered in other technical photography courses, including UV, IR, 3D, holography, electrophotography, x-ray, and non-silver applications. (For upper-division PPHT students; others with permission of the instructor)

Credit 3

A creative color workshop with the goal of producing visually effective color photographs. The student is free to choose from a large variety of assignment suggestions to structure a program individually as an independent study. Besides creativity, principles of design and photographic controls will be important. Most photographs will be produced on color transparency material. The last two weeks can be spent color printing for those wishing this experience.

Students are expected to furnish their own small or medium format cameras and supplies. Large format cameras and chemicals are furnished. Color film and paper expenses can be expected to run as high as $75 to $100. (Some previous photographic experience required. Registration limited; permission of the instructor)

Credit 9 (SR)

The tasks and responsibilities of management in creating a company-wide quality improvement environment are addressed with an emphasis on the unique challenges in the graphic arts and photographic industries. The specific requirements of planning, control, and improvement of quality are discussed with regard to such topics as mass inspection measurement, statistical process control, employee participation, quality costs, training, and vendor certification, among others. Case studies of companies and organizations currently undergoing a quality transformation will be reviewed.

Credit 3

A proficiency-oriented course designed to train students to operate and take photographs with a scanning electron microscope (SEM). Emphasis is on understanding and optimization of the instrumental and photographic parameters associated with the SEM. (PPHT-211, 212, 213, PPHT-412, or permission of instructor)

Credit 4

A seminar approach offered on demand when adequate numbers of students and a faculty member agree to study a subject not normally offered. Available to upper-level students.

Credit variable

A student-proposed advanced project sponsored by a faculty member. Approval of the proposal by the department chairman and the school director required. Available to upper-level students with a GPA of 3.0 or higher.

Credit variable
Center for Imaging Science

All courses in the Center for Imaging Science are offered at least once annually, except as noted.

Imaging Science

PIMG-220  Introduction to Imaging Science
Registration #0925-220
This course is offered during Summer Quarter to students who wish to transfer to the Imaging Science BS degree program at the sophomore level. Prerequisites for the course include one year each of physics, calculus and chemistry (with lab) at the college level. Topics include basic materials and methods of imaging science, an introduction to RIT’s computer system and the C language. Laboratory experiments include image sampling and quantization, optical imaging, densitometry and sensitometry.
Credit 8

PIMG-231  Survey of Imaging Science
Registration #0925-231
Survey of Imaging Science is the first course in the curriculum. It describes the field of imaging science and introduces students to the component parts of many imaging systems.
Class 2, Lab 3, Credit 3

PIMG-232  Imaging Science Seminar
Registration #0925-232
Survey of the features of several imaging systems, including optical systems, radar, sonar, x-ray, holography, etc. (PIMG-231, 241)
Class 2, Credit 2

PIMG-233  Introduction to Imaging Science
Registration #0925-233
Introduction to Imaging Science continues the work begun in PIMG-231 and PIMG-232, introducing students to several non-conventional imaging systems. The student designs and performs an independent project.
Class 2, Lab 2, Credit 2

PIMG-241  Introduction to VAX/VMS C
Registration #0925-241
An introductory-level course in computer programming techniques to solve problems in the field of imaging science. The student will be introduced to the VAX/VMS operating system and the VAX (ANSI) C programming language and shown how to use these facilities to solve computational problems.
Class 3, Credit 3

PIMG-345  Interaction Between Light and Matter
Registration #0925-345
This course emphasizes the interaction of electromagnetic energy with various states of matter. This includes the creation, propagation, and destruction of electromagnetic energy. Topics covered include: the electromagnetic spectrum; reflection, absorption, and transmission of energy; vibrations and simple excitations; molecular orbitals; band theory; and optical interactions. (SPSP-314, SCHG-213)
Class 4, Credit 4

PIMG-351,352  Math and Computation for Imaging Science
This two-quarter course covers mathematical topics of special importance and relevance to imaging science. Topics include: vector analysis, matrix analysis, complex variables and analysis, linear algebra, differential equations, and Fourier analysis. (SMAM-305)
Class 4, Credit 4

PIMG-361  Geometrical Optics
Registration #0925-361
An introduction to the characteristics of optical components and optical imaging systems; refracting and reflecting surfaces and components; stops, pupils, and the propagation of energy through optical systems. Discussion of lenses, cameras, collimators, telescopes, and other instruments. Limitations on system performance. (SPSP-312)
Class 3, Lab 3, Credit 4

PIMG-362  Physical Optics
Registration #0925-362
An introduction to the principles of wave optics. Topics include one- and two-dimensional vibrations; wave motion; superposition of waves; polarization; interference and interferometry; single, double, and multiple slit diffraction; and coherence. (SMAM-251, 252, PIMG-231, 232, 233, or permission of instructor)
Class 3, Lab 3, Credit 4

PIMG-446  Statistics I
Registration #0925-446
An introduction to the theory and application of statistical methods; events and sample spaces; fundamental probability concepts; mathematical foundations of discrete probability functions and continuous probability density functions; moments and moment generating functions as a means for studying the properties of probability functions; central tendency and dispersion of probability functions. Fundamental examples of random processes encountered in imaging systems are used to illustrate the mathematical and statistical techniques developed. Programming assignments are required. (Junior status in CIS)
Class 4, Credit 4

PIMG-447  Statistics II
Registration #0925-447
Introductory hypothesis testing of means and variances is developed in the context of evaluation of experimental objectives. Linear regression, techniques of analysis of variance, regression models. Analysis of variance is then developed as a general experimental tool. Methods of experimental error propagation are developed. Programming assignments are required, and statistical software packages are presented. Advanced topics such as spline fitting, simplex analysis, and principal components are discussed. (PIMG-446)
Class 4, Credit 4
Class 3, Credit 4 (offered quarterly)

PIMG-451,452,453 Digital Image Processing
Registration #0925-451, 452,453
The principles, techniques and applications of digital image processing are introduced. The course considers formation of digital images, sampling and quantization, image input/output devices, image statistics and descriptors (e.g. histograms). Geometrical, point, neighborhood, and global mathematical operations on digital images will be considered, including kernel operators and discrete convolution. Other mathematical representations of discrete image information will be introduced, including the discrete Fourier transform. Applications of image processing will be described. Emphasis is placed on implementation of image operations. (PIMG-241, 352)

Class 3, Credit 3

PIMG-461 Radiometry
Registration #0925-461
This course considers the generation, propagation, absorption and measurement of electromagnetic radiation. Sources, detectors, spectrometers, and measurement devices are treated with an emphasis on approaches to quantification of electromagnetic radiation levels. (PIMG-351, SPSP-313)

Class 3, Lab 3, Credit 4

PIMG-462 Vision, Color and Psychophysics
Registration #0925-462
An intensive course covering aspects of the human visual system, psychophysics, and colorimetry which are fundamental to the field of imaging science. Topics include: spatial vision, temporal vision, color vision, machine "vision," psychophysical techniques, scaling, and colorimetry. (PIMG-461)

Class 3, Lab 3, Credit 4

PIMG-463 Macroscopic Imaging Systems Analysis
Registration #0925-463
This course consolidates the understanding gained in the previous three courses in this series (PIMG-345, 461, 462), and develops a general description for the way in which the macroscopic (large-scale) input/output properties may be defined and related. Image input/output variables are developed which are relevant for black-and-white and color imaging systems, for continuous and discrete imagery, for hard copy and soft display. Understanding of how these variables are related to the basic parameters used in image processing is developed. Methodology examples are given for chemical, optical and electronic imaging systems, and input/output models are derived for a selection of these systems. (PIMG-462)

Class 3, Credit 3

PIMG-506 Technical Communication and Research Practices
Registration #0925-506
This course is designed to develop skills in scientific research, including use of library resources, technical report writing, technical presentations. Students are required to research, write, and present a proposal for a research project. The proposed research is performed in PIMG-507, 508.

Class 3, Credit 3

PIMG-507,508 Senior Project
Registration #0925-507, 508
Students perform the independent research project defined in PIMG-506 under the direction of a faculty member in imaging science. The student presents the results of the project to a public meeting at the end of the spring quarter.

Class 3, Credit 4 (offered quarterly)

PIMG-511 Optical Instrumentation
Registration #0925-511
The geometrical theory of image formation through optical systems and applications to optical instrumentation. Topics addressed are paraxial optics of axisymmetric systems, cardinal points, pupils and stops, propagation of energy through lens systems, types of lenses and optical elements (refracting and reflecting prisms, gradient index lenses, special purpose lenses), optical instruments, aberrations in optical images. (PIMG-361, 362)

Class 3, Credit 3

PIMG-512 Electro-Optics I
Registration #0925-512
The wave theory of light and related phenomena. Topics addressed are: electromagnetic theory and Maxwell's equations, vector waves, diffraction, coherent imaging, holography, interference and thin films. (PIMG-361, 362)

Class 3, Credit 3

PIMG-513 Electro-Optics II
Registration #0925-513
Topics addressed: vector waves; propagation of light through uniform and crystalline media; optical activity; electro-optic, magneto-optic, and acousto-optic interactions; optical waveguides, and lasers. (PIMG-512)

Class 3, Lab 3, Credit 4

PIMG-541 Fundamentals of Optics
Registration #0925-541
An introduction to the principles of optics that form the basis for further study in the field. Topics include one- and two-dimensional vibrations, wave motion, superposition of waves, interference and interferometry, single, double, and multiple slit diffraction, and polarization. Lenses, mirrors, prisms, diffraction gratings, lasers and other radiation sources are described as fundamental components in optical systems. (SPSP-313)

Class 3, Lab 3, Credit 4

PIMG-543 Optical Engineering
Registration #0925-543
An introduction to the characteristics of optical components and their combination into instrument and imaging systems. Radiation sources. Refracting and reflecting optical components. Stops, pupils and the propagation of energy through optical systems with both image forming and image recording elements. Radiation measurement techniques and apparatus. Discussion of lenses, cameras, collimators, telescopes, alignment and measurement apparatus, and other instruments. Limitations of system performance. (PIMG-541)

Class 3, Lab 3, Credit 4

PIMG-551,552,553 Special Topics in Imaging
Registration #0925-551, 552,553
Topics of special interest, varying from quarter to quarter, selected from the field of imaging science and not currently offered in the division's curriculum. Specific topics are announced in advance. (Not offered each quarter. Consult director of the Center for Imaging Science)

Class, Credit variable
PIMG-561, 562, 563
Registration #0925-561, 562, 563
Microelectronic Chemistry I, II, III
Selected topics from organic, polymer, physical, and photographic chemistry important to the understanding of silver-halide, diazo and photo resist materials (EMCR-340, PIMG-221, PIMG-543)

Class 3, Lab 3, Credit 4

PIMG-566
Imaging Systems Analysis
Registration #0925-566
An analytical approach to evaluating imaging systems using linear systems theory. The concepts of convolution and Fourier methods and the use of frequency analysis and Fourier methods are emphasized. (PIMG-351, 352)

Class 3, Credit 3

PIMG-567
Advanced Imaging Systems Analysis
Registration #0925-567
This course is a continuation of PIMG-566 and extends the linear-systems formalism for analyzing and characterizing imaging systems; point, line, and edge spread functions; optical, modulation, and phase-transfer functions; coherent and incoherent optical systems. (PIMG-566)

Class 3, Credit 3

PIMG-568
Quantum Limitations of Imaging Processes
Registration #0925-568
The effects of random variations in collected radiant energy and/or detector response on image quality; characterizing stochastic processes and noise; film graininess and granularity; propagation of quantum effects through a linear system to the image. (PIMG-567)

Class 3, Credit 3

PIMG-599
Independent Study
Registration #0925-599
A student-proposed advanced project sponsored by an instructor. Approval required by the department chairperson and the director of the school. Available to upper-level students with a GPA of 3.0 or greater.

Class, Credit variable

School of Printing Management and Sciences

All courses in the School of Printing Management and Sciences are offered at least once annually, except as noted.

PPRM-205, 206, 207
Newspaper Seminar I, II, III
Registration #0910-205, 206, 207
This three-quarter, sequential, one-credit-hour course is required for all Newspaper Operations Management majors. All other majors must have faculty approval to enroll. Course topics revolve around the newspaper industry in relation to the printing industry in general. The basic purpose is to provide an understanding of how the newspaper industry is similar to, and different from, the printing industry in general.

Specific topics will include the technological and management considerations unique to newspaper production. This course will also serve as an introduction to the technology and procedures applied in the Newspaper Production Laboratory (NewsLab), that will play a major role in the other required newspaper courses.

Class 1, Credit 1 (each quarter)

PPRM-240
Printing Financial Controls
Registration #0910-240
Plant accounting systems covered as a tool for improving production management decisions. Topics include accounting’s general philosophy and structure, inventory, equipment, job cost, standard cost and analysis of variance, budgeting and control techniques.

Class 4, Credit 4

PPRM-260
Printing Planning Concepts
Registration #0910-260
A required professional course designed to provide the student with the basic principles of price determination as it relates to marketing. Special emphasis on estimating will link those marketing concepts with practice to arrive at a selling price for printed materials. Class discussions, readings and problems will be directed toward a better understanding of the relationship of marketing and planning in a printing environment.

Class 4, Credit 4

PPRM-261
Standard Software Packages
Registration #0910-261
An introduction to software available at RIT on both the VAX/VMS system and on microcomputers housed in various locations on campus. Emphasis is on use of electronic mail, word processing, spreadsheets, statistical packages, database management and communications software to generate, analyze and present information relevant to the printing industry.

Class 2, Credit 2

PPRM-262
Technical Writing I
Registration #0910-262
A review of writing skills; an analysis of the purpose, problem, and audience of specific writing tasks. Consideration of the principles, techniques, organization, and appropriate format, style, tone, and word choice to achieve a desired writing purpose. Lectures presenting new material and reviewing assignments; in-class writing, critiquing, and rewriting. (English Composition, GLLC-220)

Class 2, Credit 2
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Registration #</th>
<th>Description</th>
<th>Class</th>
<th>Credit</th>
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</thead>
<tbody>
<tr>
<td>PPRM-263</td>
<td>Technical Writing II</td>
<td>0910-263</td>
<td>Discussion of fundamentals of modern technical and business writing: brief review of writing skills, audience analysis, and discussion, and selection of appropriate style, tone, and format. Discussion of research techniques, documentation, and presentation of a formal technical report. (PPRM-262)</td>
<td>Class 2</td>
<td>Credit 2</td>
</tr>
<tr>
<td>PPRM-280</td>
<td>Printing Management Leadership Concepts</td>
<td>0910-280</td>
<td>This required course is designed to give students basic knowledge of the systems approach to management by studying the management of functions in production organizations. Emphasis is on people input and the system. Class sessions include lectures, films, discussions, etc., as appropriate. Homework includes reading and writing assignments.</td>
<td>Class 4</td>
<td>Credit 4</td>
</tr>
<tr>
<td>PPRM-305</td>
<td>Magazine Writing and Design</td>
<td>0910-305</td>
<td>A discerning look at what goes on in the competitive world of magazine publishing. An overview of the history, the business side, and the production side of the magazine industry. The first week will be devoted mainly to writing techniques, and the second week to the design techniques.</td>
<td>Class 3</td>
<td>Credit 3 (SR)</td>
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<tr>
<td>PPRM-320</td>
<td>Introduction to Magazine Publishing and Management</td>
<td>0910-320</td>
<td>A survey course designed to give the student insights into the editorial, production, management, fulfillment and distribution processes vital to the success of any magazine. Leaders from the magazine publishing industry are invited to present 3-hour guest lectures on a major aspect of their profession. Graduates of the printing program who have attained prominence within the industry are often guest speakers, encouraging interaction between current and former students.</td>
<td>Class 3</td>
<td>Credit 3</td>
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<tr>
<td>PPRM-350</td>
<td>Economics of Production Management</td>
<td>0910-350</td>
<td>Microeconomic study of factors in printing production systems. Supply and demand theories are applied to printing system inputs and outputs.</td>
<td>Class 4</td>
<td>Credit 4</td>
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<tr>
<td>PPRM-360</td>
<td>Estimating Practice</td>
<td>0910-360</td>
<td>A detailed study of the practice of estimating that will provide the student with the understanding that the final price of a printed job is the result of a series of planning decisions made during the estimating process. Development and the use of production standards and hourly rates will be analyzed to determine their importance in the pricing structure of printed materials. (PPRM-260)</td>
<td>Class 4</td>
<td>Credit 4</td>
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<tr>
<td>PPRM-361</td>
<td>Electronic Printing Standards</td>
<td>0910-361</td>
<td>A study of existing and emerging standards for the representation, creation, manipulation, storage, retrieval, translation, and output of documents and publications. Lab projects will be assigned regularly and will be presented in the form of problems to be solved by the students using software tools provided by the instructor. Students will be expected to have command of a programming language such as BASIC, Pascal, Modula-2, or C. (ICSA-208 or equivalent)</td>
<td>Class 3, Credit 3, Open Lab</td>
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<tr>
<td>PPRM-375</td>
<td>Printing Operation Measurement and Improvement</td>
<td>0910-375</td>
<td>Explores practical techniques that printing companies can use in the areas of methods improvement, work measurement and control, production standards and operations indicators, equipment evaluation, proposals and financial analysis, systems analysis and standard practice instructions.</td>
<td>Class 4, Credit 4</td>
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<tr>
<td>PPRM-380</td>
<td>Supervision in the Graphic Arts</td>
<td>0910-380</td>
<td>This course is designed to enable the student to meet the social, employee and management needs in the manning of a graphic arts operation. Subjects covered are: the nature of the employment relation; hiring; motivation and training; discipline; firing; layoffs and plant closures. (PPRM-280)</td>
<td>Class 4, Credit 4</td>
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<tr>
<td>PPRM-381</td>
<td>Dynamics of Personal Leadership in Printing</td>
<td>0910-381</td>
<td>Required for third-year students in the PPRP program to prepare for more effective leadership and personal success in the printing industry. Provides guided opportunities for students to consider printing management principles in more practical, laboratory-type situations that can be provided in larger lecture-hall concepts courses. The purpose is to facilitate applications of management theory in career-related situations. This course helps students understand the nature of the printing industry and the personal skills, habits, etc. that will improve their effectiveness in an industry position.</td>
<td>Class 5, Credit 3</td>
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<tr>
<td>PPRM-420</td>
<td>Electronic Communications in the Printing and Publishing Industries I</td>
<td>0910-420</td>
<td>Presentation of an overview of electronic communication theory and its application to the publishing industry. The course provides the student with the background necessary to relate publishing requirements to electronic system parameters. Several practical newspaper systems are discussed. (SMAM-225, 226)</td>
<td>Class 4, Credit 4</td>
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</tr>
</tbody>
</table>
PPRM-430 Advanced Business Forms Production
This course extends PPRM-330, Introduction to Business Forms, by going more deeply into the study of some forms products introduced in that course, specifically through lab work, and by studying additional production management aspects of forms. Lecture hours are used to discuss management aspects of forms plants. Students are encouraged to discuss what they have observed in other classes, field trips, lab work, and co-op experience. Lab time is used to give students experience in forms production with emphasis on understanding the work required and the problems associated with managing production. As far as possible, the work is done within school labs, supplemented by field trips to cooperating plants.
Class 2, Credit 4, Lab 6

PPRM-462 Computer Estimating Systems
A continuation of PPRM-360 in which more complex jobs are estimated, including some on the web offset press. An introduction to the use of the computer in estimating: comparative estimates are made and graphed to determine optimum printing quantities for press size, imposition and cost. An analysis of computer estimating systems provides a guide to selection and use of these systems. (PPRM-360)
Class 4, Credit 4

PPRM-505 Management of Training in the Graphic Arts Industry
Students examine the role and issues associated with training in the graphic arts industry. Topics include the growth and importance of training in the industry, roles and responsibilities of training personnel, the nature of training, resources available to training managers, and financial considerations of training. (PPRT-500)
Class 3, Credit 3

PPRM-506 Business Law
Elements of the laws of contracts, agency, sales, partnerships, corporations, taxes, insurance, workers' rights, and other laws pertaining to business, printing and publishing.
Class 3, Credit 3

PPRM-508 Legal and Ethical Conduct of Printing Businesses
A study of the legal and ethical implications faced by printing companies when involved in making day-to-day and long-term business decisions. Students become acquainted with current printing business ethics, as well as the various laws regulating competition in the printing industry marketplace. Students are shown the impact their various business decisions will have upon their companies, co-workers and themselves.
Class 4, Credit 4

PPRM-511 Labor Relations in Graphic Arts
A study of the organization of the United States labor force through the impact of national legislation and the construction of the same by United States Supreme Court and National Labor Relations Board decisions. Study includes rights of employees, their free choice of representation, duty of fair representation, right to strike, and future modification of the field.
Class 4, Credit 4

PPRM-513 Sales in the Graphic Arts
Explores economic, psychological and sociological bases of selling, with emphasis on customer and salesmen interplay as well as techniques and practices of creative salesmanship in graphic arts companies. This course aims at benefiting both students considering a career in sales and those who will otherwise work with salesmen, either by supporting their company's salesmen in plant action or by buying from outside salesmen.
Class 4, Credit 4

PPRM-514 Newspaper Management
Consideration of personnel, organization, finance, maintenance, advertising, circulation, and other sources of revenue as they pertain to the metropolitan press; problems and practices of plant supervision.
Class 4, Credit 4

PPRM-515 Legal Problems in Publishing
A comprehensive review of United States Supreme Court decisions as they relate to the unique rights granted to the graphic arts industry. Cases cover Article I, Section 8 of the United States Constitution and the First and other amendments.
Class 4, Credit 4

PPRM-516 Marketing in Graphic Arts
Key concepts and issues underlying the practice of marketing in graphic arts industries are discussed by the class. Discussion is encouraged to develop predisposition to use marketing rather than to merely acquire facts about marketing.
Class 4, Credit 4

PPRM-518 Purchasing in the Graphic Arts
Role of the purchasing agent in the printing plant. Methods of procurement, purchasing policies and sources of supply. Characteristics of graphic arts materials and supplies; quality assurance; inventory control; economic order quantity determination; make or buy decisions; blanket orders; capital investment decisions; the purchase order as a legal document.
Class 4, Credit 4

PPRM-520 Systems Planning
An introduction to problem-solving techniques utilizing applied statistical tools in management situations.
Class 4, Credit 4

PPRM-530 Establishing a Graphic Arts Operation
This is an elective course for seniors only with permission of the instructor. The course is a study of the problems to be encountered in the establishment of a graphic arts operation. Students will organize their own printing-related operation as they study general planning, financing, physical requirements for operation, sales and merchandising, general management and operational problems. The purpose of the offering is to coordinate students' activities with a focus on the benefits and burdens of the responsibility of establishing a graphic arts business. (Senior status with instructor permission)
Class 3, Credit 3
This required professional course is designed to give students a broad overview of the underlying concepts and scientific principles that are common to both the printing process and press systems. Class sessions will consist of lectures, including films and videotape presentations. Outside assignments will consist of reading assigned portions of textbooks, vendor literature and journal articles related to the lecture topics.

Class 4, Credit 4

PPRT-230  Printing Processes Concepts
Registration #0911-230
This required professional course is designed to give students a broad overview of the underlying concepts and scientific principles that are common to both the printing process and press systems. Class sessions will consist of lectures, including films and videotape presentations. Outside assignments will consist of reading assigned portions of textbooks, vendor literature and journal articles related to the lecture topics.

Class 4, Credit 4

PPRT-232  Ink and Substrates
Registration #0911-232
Provides a basic understanding of the many different kinds of ink and substrates utilized by the various printing processes. Substrate composition, runability, printability, and end-use requirements are covered, as well as the different formulation of inks and their drying systems. Requirements of each printing process and the printed product as they relate to the ink and substrate properties are covered.

Class 3, Credit 3

PPRT-234  Print-Finishing and Distribution
Registration #0911-234
Most printed products must be finished into a marketable form and distributed by various means. Print-finishing may be done in-line on web presses or in a conventional bindery. Planning for such post-press operations requires extensive knowledge from design to the finished product. This course is designed as an introduction to pre-press planning for print-finishing and distribution.

The emphasis is on cost-effective planning and management, familiarization with the mechanical limitations in print production and on modern tools and methods in distribution technologies.

Class 3, Credit 3

PPRT-250  Concepts of Design and Typography
Registration #0911-250
This is an introductory course designed to acquaint students with the principles of two areas: 1) printing design; 2) typography. Extensive use of slides, overhead materials, handouts and, where appropriate, movies and videotapes will be shown.

Class 4, Credit 4

PPRT-270  Pre-press Imaging Concepts
Registration #0911-270
This required professional course is designed to give students a broad overview of the underlying concepts and scientific principles that are common to image generation, capture, processing, storage display and transfer technologies used in the graphic arts industry. Class sessions will consist of lectures interspersed with films and other audiovisual aids. Homework assignments will consist of reading assigned portions of textbooks, vendor literature, and journal articles related to the lecture topics. In addition, written assignments consisting of paraphrasing of relevant technical articles will be required.

Class 4, Credit 4

PPRT-313  Copy Preparation
Registration #0911-313
Preparation of copy for camera, working from layouts, making analysis of requirements; pasteup techniques, methods of pre-separation mechanicals, "keyline" mechanicals, use of photographic and typographic copy. Relation to production is stressed by shooting copy on camera, stripping and proofing; proper instructional specification writing. Design and production of individual 4-color; process pre-separation. (PPRT-230, 250, 270)

Class 2, Lab 6, Credit 4

PPRT-317  Calligraphic Forms
Registration #0911-317
An introduction to the basics of calligraphy, exercises in use of broad edge pen to develop primary forms of Italic, Roman Capitals, and Uncial letter styles. Evolution of letter forms. Consideration of historical origins of letters, use of basic tools, understanding of methods and disciplines stressed.

Class 3, Credit 3
PPRT-319  
**Newspaper Design**

A study of the methods of designing modern newspaper pages; a look at a variety of front page design methods as well as inside pages; placement of editorial content and ads; problems involved in designing section pages and special pages and editions; the standard format vs. the tabloid format; page sizes, column widths, and space between columns; how a computer can be used in creating designs for newspaper pages.

Class 2, Lab 3, Credit 3

PPRT-320  
**Newspaper Production I**

A study of the methods of producing a newspaper by the use of photocomposition systems and the offset process. Students organize a staff, design a newspaper, set type, paste up pages, go to camera, make plates, and go to press.

Class 2, Lab 3, Credit 3

PPRT-322  
**Circulation and Mailroom**

A study of the organization and functions of newspaper circulation departments. An overview of equipment and techniques used in modern newspaper mailrooms. A study of readership and how it relates to newspaper circulation.

Class 3, Credit 3

PPRT-329  
**Introduction to Book Design**

A course intended to give the student an understanding of how a book designer functions within a book publishing firm. Emphasis is placed upon the many factors involved in book design decisions, including the important relationship between book design and book production in producing a readable, functional book. (PPRT-301, 303—offered once each year)

Class 2, Lab 3, Credit 3

PPRT-330  
**Advanced Concepts of Newspaper Production Systems**

The production of a newspaper by photocomposition methods and the offset process. A continuation of PPRT-320, in more depth, with special emphasis on pre-press operations, and the production of special editions. Also, emphasis on the use of color in newspaper production. (PPRT-320)

Class 2, Lab 3, Credit 3

PPRT-331  
**Bookbinding**

An introductory course to the skills of bookbinding and contemporary preservation procedures used to save our printed heritage. Content will cover methods and techniques used in hand bookbinding, including sewing, adhesive binding, gilding and boxmaking. Basic conservation skills are taught. Library binding and end-use requirements of bound products are studied and tested in order to obtain thorough knowledge of the physical requirements of bound books. Course is designed for those who value good craftsmanship and have an interest in binding books. No prerequisite is required. However, a good dexterity is desired. Students should bring several books of their own for rebinding.

Class 3, Credit 3 (SR)

PPRT-332  
**Ink and Color**

Theory of light and color; basic theory of process color and corrections; theory and applications of CIE color system; color matching systems; theory and applications of various ink systems; correlation of ink properties with applications, with emphasis on relationships of ink to paper and press; study of ink problems and their correction.

Class 4, Credit 4

PPRT-333  
**Introduction to Book Production**

A course designed to introduce the student to the many-faceted role of the production manager in a book publishing firm. Production's role throughout the publishing cycle from manuscript to bound books is examined, and detailed emphasis is placed upon determining production and purchasing requirements for producing a variety of books, including trade books, textbooks, juveniles and special editions.

Class 3, Credit 3

PPRT-334  
**Print Finishing Management**

Planning for successful print finishing requires in-depth knowledge of production phases from design through pre-press planning, press, bindery and distribution. This course emphasizes cost-effective planning and management, based in part on an awareness of the mechanical limitations involved in print production and in a contemporary print-finishing environment. (PPRT-234)

Class 2, Lab 3, Credit 3

PPRT-335  
**The Printed Book In America**

A course which traces the main currents in the development of the printed book in America by closely examining the books themselves. In addition, close study of the lives and works of the great printers, their equipment and available technology, and their aesthetic viewpoints is undertaken to determine their impact on their times and their relevance for today. Classes are held in the Melbert B. Cary Jr. Graphic Arts Collection.

Class 3, Credit 3

PPRT-337  
**Art of the Printed Book 1455-1955**

This course presents masterpieces of the printer's art from the past five centuries. The lives and works of great European printers from Gutenberg to Mardersteig are examined, and their historical impact on Western civilization discussed with a view toward determining new perspective for today's graphic artisan and book printer. Classes are held in the Melbert B. Cary Jr. Graphic Arts Collection.

Class 2, Lab 6, Credit 4

PPRT-338  
**Flexographic Process**

A fundamental course based on the principles and practices of the flexographic printing process. Continues on from the basic information given in PPRT-230. Emphasis is placed on the elements of the technology from artwork, plates, platemaking, inks and presswork. Lab offers hands-on work centered around platemounting, ink formulation and presswork. Students print on a wide variety of presses and substrates. (PPRT-230 or PPRT-200)

Class 2, Lab 3, Credit 3
PPRT-339 Gravure Process
Registration #0911-339
Building upon concepts of the gravure process learned in PPRT-230, this course expands on the theories and practices of the gravure process. The course includes both cylinder imaging and press work and involves information on related techniques, equipment, materials and supplies. The course is conducted by means of lectures, class discussions, demonstration and laboratory exercises involving chemical etching of cylinders, helio engraving of cylinders, and four-color printing on a four-unit web press. (PPRT-230 or PPRT-200)
Class 2, Lab 3, Credit 3

PPRT-340 Lithographic Process
Registration #0911-340
This course builds upon the material encountered in PPRT-230. More detailed discussion is made of the equipment and materials that make the lithographic process. Topics include press, the image carrier and its chemistry, inks and fountain solutions. (PPRT-230 or PPRT-200)
Class 2, Lab 3, Credit 3

PPRT-341 Screen Printing Process
Registration #0911-341
This course is designed to acquaint students with screen printing and how it is used as a commercial printing process, stressing recent technological advances. Areas of emphasis include: frame construction, fabric selection; stretching of fabric; photographic stencil systems; screen printing inks; substrates; also including an overview of modern screen printing presses. The economics of screen printing and its relationship to the total area of the graphic arts industry is stressed throughout the course. (PPRT-230 or PPRT-200)
Class 2, Lab 3, Credit 3

PPRT-342 Properties of Paper
Registration #0911-342
This course begins with a discussion on papermaking fibers, pulping procedures, and papermaking machines and proceeds to show how they affect paper properties and printing characteristics. Laboratory experiences include stock preparation, making paper and paperboard, sizing and coating paper, physical and optical testing of paper and paper identification.
Class 3, Lab 2, Credit 3

PPRT-351 Applications of Typographic Concepts
Registration #0911-351
An elective course that allows the students to apply the concepts of typography to practical applications. By utilizing the equipment of the typographic laboratory, each student will be expected to produce finished typographic projects. The intent of this course is to build confidence in students and sharpen their ability to judge and produce works of a typographic nature. (PPRT-250)
Class 2, Lab 3, Credit 3

PPRT-352 Applications of Printing Design Concepts
Registration #0911-352
An elective course that introduces students to the application of traditional rendering techniques and computer-aided technology as tools for creating visual solutions to printing design problems. Emphasis is placed on the arrangement of typographic and pictorial elements to illustrate and expand on the concepts gained from the prerequisite course. (PPRT-250)
Class 2, Lab 3, Credit 3

PPRT-372 Image Capture and Conversion
Registration #0911-372
This elective professional course introduces the student to the materials and processes used by the graphic arts industry to capture and store images. It also examines both optical and electronic methods of converting those images to forms suitable for producing the image carriers required by the major printing processes. A systems approach is used to prepare students to make sound business decisions in the development and management of pre-press facilities. (PPRT-270)
Class 2, Lab 3, Credit 3

PPRT-373 Techniques of Image Assembly
Registration #0911-373
An introductory course in black-and-white and color-image assembly. Lab projects are assigned with the purpose of covering a wide variety of layouts requiring different techniques and often the creation of necessary contact or duplicating films of the roomlight variety. In addition to standard practices the student also works with the latest model line-up tables and a Micromodifier for spreads and chokes and receives basic instruction in electronic page make-up (Autoprep 5000). Other automated pre-press imposition systems are covered in the form of slide-lectures. (PPRT-270)
Class 2, Lab 3, Credit 3

PPRT-375 Electronic Composition Systems
Registration #0911-375
An elective course in photocomposition. Formatting and code structures are utilized for typographic problems. Specialized typesetting hardware and software are analyzed for electronic composition systems with digital type storage. (PPRT-250, PPRT-270)
Class 2, Lab 3, Credit 3

PPRT-376 Electronic Composition Workshop
Registration #0911-376
An advanced course in the area of composition. The emphasis is upon developing an in-depth understanding of the various aspects of a composition system. An individualized term project is selected by the student, with instructor permission, and an oral and written presentation is made upon completion. The course is conducted by lecture, discussion, and supervised laboratory assignments with individualized projects. (PPRT-375 and instructor's permission)
Class 2, Lab 6, Credit 4

PPRT-382 Tone Reproduction and Halftone Analysis
Registration #0911-382
A comprehensive treatment of monotone graphic arts photography to an advanced level. Human visual perception, halftone sensitometry, and process control are emphasized as important factors for the aesthetic and consistency of printed pictorial reproduction. Topics include densitometry, contact screens, flare, reciprocity law, two-point and three-point halftone sensitometry, electronic screening, film contacting and automatic film processing and its control, plate/press characteristics, dot gain, criteria for subjective tone reproduction, and the Jones diagram for objective tone reproduction analysis. (PPRT-372)
Class 2, Lab 3, Credit 3
PPRT-390 Application of Electronics to Graphic Arts
Registration #0911-390
A basic course in the fundamentals of electricity and electronics covering direct current, alternating current, semiconductors and transistors. Theory will be applied in lab experiments as well as with graphic arts machines and devices. Students will perform laboratory experiments using basic electronic components and instruments. (SMAM-220, SMAM-225)
Class 2, Lab 3, Credit 3

PPRT-438 Advanced Flexography
Registration #0911-438
An advanced course in the principles and practices of the flexographic printing process. Expanded lab time allows students to get into greater depth in all phases of flexographic technology. Students perform all operations necessary to print a large variety of substrates on all lab presses. (PPRT-338)
Class 2, Lab 6, Credit 4

PPRT-439 Advanced Gravure
Registration #0911-439
Building upon PPRT-339, this is an advanced laboratory and technical course embracing the theories and practices of the gravure printing process. Classes include such new course content as electronic image processing, color proofing systems, quality assurance testing for packaging printing, press-side color testing, press design concepts, and the economics of the gravure process. Course includes lectures, laboratory exercises, guest speakers and plant tours. (PPRT-339)
Class 2, Lab 3, Credit 3

PPRT-441 Screen Printing II
Registration #0911-441
Further study of the theory and practice of screen printing that will include such topics as experiments with fabric in screen making, stretching screen fabrics on one or more of the tensioning devices, stencil films and the effect they have on a finished product, study of the inks and substrates common to the screen printer. Areas of concentration with this course may be one of the following: flat-bed cycling presses; automatic cylinder screen printing press; container press capable of printing cylinders, conicals, ovals and flat objects; GSP Graphix 2 for making positives from masking materials or cut stencils; and ultra violet curing inks common to the screen printing industry. (PPRT-341)
Class 2, Lab 3, Credit 3

PPRT-442 Lithographic Press Problems
Registration #0911-442
An advanced course in the theory, practice, and problems of offset presswork. Further development of technical knowledge of materials and equipment. Practice in running process color work. (PPRT-340)
Class 2, Lab 6, Credit 4

PPRT-444 Web Offset
Registration #0911-444
An analytical study of the technological development in web offset. Emphasis on the interrelationship of procedures, materials and equipment. Practical laboratory projects on a commercial four-unit perfecting web offset press. (PPRT-340)
Class 2, Lab 2, Credit 3

PPRT-452 Layout and Print Design II
Registration #0911-452
An advanced course involving discussion of traditional design, use of grids, historical evolution of design and contemporary design solutions. Typical commercial printing design problems are explored in laboratory projects, from rough to comprehensive layout. The laboratory problems incorporate traditional rendering techniques with desktop electronic publishing output to produce presentation pieces. (PPRT-352)
Class 2, Lab 6, Credit 4

PPRT-461 Development of Printing Types
Registration #0911-461
Historical development, identification, and classification. A lecture course that looks at the historical development of the typefaces that we use every day. Classification methods are discussed and analyzed. With slides, we look at representative typefaces, learn their visual characteristics for identification, who the designers are and the foundries, etc., that created them. (PPRT-351)
Class 3, Credit 3

PPRT-472 Color Separation Systems
Registration #0911-472
A study of basic color theory, materials and methods used in the printing industry for the reproduction of color originals. Emphasis is placed on color separation systems and the requirements for producing good quality color. Topics include the major separation methods, color proofing, electronic color scanning, production methods, quality color, and an introduction to color electronic pre-press systems. (PPRT-372 or PPRT-591)
Class 2, Lab 3, Credit 3

PPRT-500 Quality Control in the Graphic Arts
Registration #0911-500
A study of what quality is and the importance of quality control in printing. Emphasis will be on how elementary statistics, management commitment and participation, and graphic arts "know-how" offer sensible approaches to quality control in printing. Topics include the conceptual aspect of quality and quality printing, defect detection versus defect prevention, establishment of the process capability via sampling and statistics, the use of statistical process control (SPC) tools, management role in creating quality environment, densitometry for measurement, ANSI standards on color printing, use of quality control devices for process control, and case studies on planning and implementing quality improvement programs in various printing environments. (SMAM-319)
Class 3, Credit 3

PPRT-510 Color Perception & Measurement
Registration #0911-510
Addresses principles of human color perception and studies the correlations between subjective quality ratings and objective measurements such as densitometry, filter-colorimetry, and spectrophotometry. Class sessions are combination of lectures, discussions, and labs. In addition, guest lecturers and video tapes will also be utilized. (PPRT-500)
Class 2, Lab 3, Credit 3

PPRT-541 Typographic Workshop
Registration #0911-541
Allows students to create and solve typographic problems of their own choice. Complete freedom is given and experimentation is encouraged, giving students opportunities to meet their own objectives and satisfaction.
Class 2, Lab 6, Credit 4
PPRT-551 Special Topics—Printing
Registration #0911-551
This course presents and investigates technological topics which normally are not covered in the regular curriculum on a one-time basis. Guest lecturers such as industry leaders as well as regular faculty are used to conduct this course. Topics to be covered are announced in advance.
Credit variable

PPRT-572 Electronic Color Imaging and Color Control
Registration #0911-572
An analytical study of color reproduction systems will give data to consistently produce good-quality color reproduction. Requirements and capabilities of electronic pre-press integrated color systems will be studied to help in the design and management of a color system, whether it be in-house or part of a network. (PPRT-472 and grade of B or higher in PPRT-472)
Class 2, Lab 3, Credit 3

PPRT-591 Reproduction Photography
Registration #0911-591
An intensive course designed for the photography major with the emphasis placed on the problems involved in achieving optimum tone reproduction from their photographs. A general understanding of the printing industry, basic printing processes, line and halftone photography, tone reproduction and image assembly techniques are covered through lecture and laboratory experiences.
Class 2, Lab 3, Credit 3
College of Liberal Arts

Criminal Justice

Major Required Courses

GCJC-201 The Criminal Justice System
Registration #0501-201
The principles of the criminal justice system; administration and management within various agencies, including the relationship of the police to the courts; the courts to the probation, correction and parole functions. Consideration will also be given to specific problems within the branches of the criminal justice system.
Class 3, Credit 4 (offered annually)

GCJC-204 Public Administration
Registration #0501-204
The course presents the principles of management and organizational theory as they relate to public agencies in general and criminal justice agencies in particular. Case studies, as well as descriptive information concerning the classic issues involved in the administering of public institutions, will be offered to the student. (GCJC-201) (Sophomore or Junior status)
Class 3, Credit 4 (offered annually)

GCJC-207 Corrections
Registration #0501-207
The course is designed to introduce the student to the basic organizations of the correctional system, their functions and performance. Prisons and jails, as well as probation and parole agencies, will be discussed within the context of historical and contemporary philosophy. Attention will also be 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 will be surveyed. (GCJC-201)
Class 3, Credit 4 (offered annually)

GCJC-301 Concepts in Criminal Law
Registration #0501-301
The subject matter of this course consists of an introduction to the fundamental principles upon which substantive criminal law is based. The basic characteristics and requirements of criminal conduct are examined. Included in the scope of this course are the following topics: the nature of criminal conduct, the meaning of criminal mental state, the requirement of concurrence between action and intent, and the requirement of legal causation. The elements of the principal defenses to criminal liability, such as insanity, entrapment, and self-defense, are also discussed. (GCJC-201) (Sophomore status)
Class 3, Credit 4 (offered annually)

GCJC-303 Law Enforcement in Society
Registration #0501-303
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 the community, police organization and community control mechanisms. (GCJC-201) (Junior status)
Class 3, Credit 4 (offered annually)

GCJC-401 Scientific Methodology
Registration #0501-401
This course provides a foundation in the uses of quantitative social science research methods with special reference to utilization of data bases and examples from criminal justice, human services and public policy. Stress will be on deducing hypotheses from theoretical frameworks, identification of the relationships among variables, establishment models, creation of null hypothesis, quantitative methods of data collection and analysis using both parametric and nonparametric methods. Research methods presented range from traditional questionnaires to computer based information and techniques. (Junior status, two math and computer course requirements)
Class 3, Credit 4 (offered annually)

GCJC-403,404 Field Experience and Field Seminar
This course is an internship practicum for all pre-service criminal justice students. The course is designed to give the student first-hand experience in the field of criminal justice in an appropriate organization which meets the needs of the student's career objectives. Students will be closely supervised at selected organizations developing their pre-professional skills while learning the organization's programs and methods. The student also will be required to attend a seminar which will run concurrently with field work. (GCJC-401, Senior status)
Class variable, Credit 4 each (F, W)

GCJC-411 Seminar in Corrections
Registration #0501-411
This course is a sequel to Corrections. It presents a critical evaluation of the contemporary correctional programs in the United States. Programs discussed include: jails, prisons, probation, parole, halfway houses, study release, work release, prison furloughs and various community-based correctional techniques. Emphasis is placed upon the theories of penology and rehabilitation, which provide direction to the correction system today, and the theoretical positions which may affect the future corrections. (GCJC-201, 207)
Class 3, Credit 4 (offered annually)

GCJC-456 The Judicial Process
Registration #0501-456
Judicial Process is designed to provide the student with an overview of the structure and function of the federal and state court systems. Emphasis will be placed on the relationship between the federal and state courts, judicial review, judicial decision making, and the courts as interpreters of constitutional rights. This course is part of the Liberal Arts American Politics Concentration and also may be taken as a Liberal Arts elective. (GCJC-201 required of GCJC students; GSSM-211 or GSSM 215 required of concentration students)
Class 3, Credit 4 (offered annually)

GCJC-500 Criminology
Registration #0501-500
A survey of the field of criminology with emphasis on major forms of contemporary crime, definition of crimes and criminality, theories of criminality, the extent of crime, criminal typologies, and fundamental aspects of the social control of crime. This course may also be taken as a Liberal Arts elective.
Class variable, Credit variable (offered annually)
### GCJC-501 Juvenile Justice
**Registration #0501-501**
The philosophical, historical and operational aspects of the juvenile justice system; evaluation of the social and personal factors related to juvenile delinquency; the role of police, the courts, corrections and community programs in delinquency prevention, control and treatment. This course may also be taken as a Liberal Arts elective.

Class 3, Credit 4 (offered annually)

### GCJC-514 Planning and Change in the Criminal Justice System
**Registration #0501-514**
It is the objective of this offering to expose the student to issues of planning within the criminal justice system. Police, courts and corrections will be discussed in view of current and proposed changes. The planning of change will be emphasized with regard to organizational issues. In addition, attention will be given to surveying various strategies for accomplishing change. This course is designed to give the advanced student the opportunity to intensively scrutinize the prospective shape of the criminal justice system. (GCJC-204) (Senior status)

Class 3, Credit 4 (offered annually)

### GCJC-526 Seminar in Law Enforcement
**Registration #0501-526**
A critical analysis of some of the current issues, problems and concerns in the area of law enforcement; emphasis on basic police functions in regard to the courts, corrections and the community. Conflicts between theory and practice are examined and analyzed, and future trends in law enforcement will be explored. (GCJC-303) (Junior status)

Class 3, Credit 4 (offered annually)

### GCJC-528 Etiology of Crime
**Registration #0501-528**
This course is a comprehensive survey of the sociological, psychological, and psychiatric views of the etiology of crime and other forms of deviant behavior. With major emphasis on the sociological forms of explanation, the course will undertake a historical review of criminality theory and progress to present-day concerns of both etiological origins. (GCJC-201, 203)

Class 3, Credit 4 (offered annually)

### GCJC-541 Research Methods in Criminal Justice
**Registration #0501-541**
Through lecture, discussion, and activities associated with a research project, the techniques and methods of data collection and analysis are presented. Students will acquire the skills necessary to conduct criminal justice research and the ability to prepare a formal research/evaluation report. The required research projects typically include data gathering and coding procedures, entry of the data to a file on the VAX/VMS, the use of application software (e.g., SPSS, MINITAB, DATAPLOT), and preparation of a final report. (GCJC-401)

Class variable, Credit 4 (offered annually)

### Professional Electives

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<th>Course Code</th>
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<tr>
<td>GCJC-206</td>
<td>Administrative Concepts in Law Enforcement</td>
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<td>Registration #0501-206</td>
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<td>The course is intended to provide the student with an overview of the fundamental concepts of organization and administration, and to provide also the criteria and/or standards by which municipal police agencies may be evaluated or improved administratively. (GCJC-203, 303) (GCJC Sophomore status or higher)</td>
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<tr>
<td>GCJC-302</td>
<td>Organized Crime</td>
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<td>Registration #0501-302</td>
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<td>This course provides a critical assessment of the structures of organized crime, its historical development, and the areas in which organized crime operates. Special emphasis will be placed upon how the character of organized crime has changed during the last 30 years, including the movement of organized crime into a variety of legitimate business enterprises. In addition current enforcement strategies will be studied and evaluated. (GCJC-201, 203) (GCJC Sophomore status or higher)</td>
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<td>GCJC-306</td>
<td>Para-Legals</td>
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<td>Registration #0501-306</td>
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<td>The course deals with criminal and civil law, matrimonial law, legal research, counseling, problem solving techniques, and lawyers' ethics as well as a study of community resources available to assist the client. (GCJC-201) (GCJC Junior or Senior status)</td>
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<tr>
<td>GCJC-307</td>
<td>Investigative Techniques</td>
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<td>Registration #0501-307</td>
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<td>The course examines the investigative function and process in the public and private sectors, which would include the history and theory of criminal investigation, crime scene searches, collection and presentation of physical evidence, the obtaining of testimony and confessions, scientific laboratory methods and the admissibility of evidence in a court of law. (GCJC-303)</td>
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<td>GCJC-405</td>
<td>Major Issues in the Criminal Justice System</td>
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<td>Registration #0501-405</td>
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<td>This course will focus on contemporary issues and topics not otherwise distinctly incorporated in established criminal justice courses. The course will concentrate on student discussion and interaction surrounding required readings on topics such as deviance, crime prevention, issues in the prosecution/court system, deterrence, female criminality, and computer applications. Topics may vary from offering to offering. (GCJC Junior or Senior status)</td>
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<td>GCJC-406</td>
<td>Computer Application in Criminal Justice</td>
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<td>Registration #0501-406</td>
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<td>This course is designed to introduce students to the use of computer-related terminology, historical, current and potential uses of computers, the classification and the use of various types of computer application programs on both super mini- and microcomputers. Standard application software packages and computer hardware systems will be discussed as they can be utilized in criminal justice settings. In addition, students will have practical experience that will include the use of text processing, data base and spreadsheet software commonly used in criminal justice agencies and academic settings.</td>
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<td>Class 3, Credit 4 (offered quarterly)</td>
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GCJC-409 Legal Rights of Convicted Offenders
Registration #0501-409
This course is designed to present an in-depth study of the substantive and procedural law as it affects convicted offenders. Considerable attention is devoted to the study of constitutional rights and privileges, how they apply to convicted offenders, and the methods employed to secure these rights. Conviction and its consequences are explored, as is the sentencing process. The rights of prisoners, probationers, and paroles are reviewed. In addition, the various remedies for enforcement of these rights are discussed, including direct appeals, collateral attacks, and a variety of post-conviction remedies. The course is intended for students who wish to pursue a career in law enforcement, corrections, probation, parole or law. However, students interested in some other aspect of criminal justice that deals with convicted offenders, may find this course useful. (GCJC Junior or Senior status)
Class 3, Credit 4 (offered periodically)

GCJC-410 Management in Criminal Justice
Registration #0501-410
This course presents the history and development of the principles of management and organizational theory as they have been applied to the field of criminal justice. This developmental evaluation is followed by a presentation of principles and philosophies of agency administration which have been effective in business, industry, and government, with the intention of discussing their applicability throughout the criminal justice system. (GCJC-204 or permission of the instructor) (GCJC Junior or Senior status)
Class 3, Credit 4

GCJC-412 Social Control of Deviant Behavior
Registration #0501-412
Designed as a professional elective for criminal justice majors interested in the major themes explaining the phenomena of deviance; how it is created and labeled through the process of definition and social sanction. Emphasis will be on that type of behavior which elicits societal response in the form of criminal or civil action and on deviance from the perspective of the deviant who may be placed under some form of legalized social control. (GCJC-201, 203) (GCJC Junior or Senior status)
Class 3, Credit 4 (offered periodically)

GCJC-413 Civil Disobedience and Criminal Justice
Registration #0501-413
A survey of the philosophy and history of civil disobedience, civil disobedience as a political tactic, differentiation between civil disobedience and "ordinary crime," civil disobedience and "non-criminals," civil disobedience with the criminal justice system, and the role of riot commissions. (GCJC-201, 203) (GCJC Junior or Senior status)
Class 3, Credit 4 (offered periodically)

GCJC-415 Domestic Violence
Registration #0501-415
This course is designed for social work students, criminal justice students, and professionals who are interested in examining the problems related to domestic conflict and violence. Included will be a study of the dynamics of violence as reflected in child abuse, incest, marital rape, spouse and parental abuse, and violence among siblings. (GCJC third year or higher)
Credit 4 (offered periodically)

GCJC-416 Forensic Photographic Evidence
Registration #0501-416
Basic photographic techniques applicable to the law enforcement profession or other investigative applications. The course will cover photographic fundamentals as they apply to the investigative photographer. This will lead to the more involved techniques of the police and fire photographer. Topics include photographing homicides and other deaths, tool mark and document photography, court presentations, surveillance and identification photography, and arson investigation. (GCJC third year or higher)
Class 3, Credit 4 (offered annually)

GCJC-457 Constitutional Law
Registration #0501-457
This course has been designed to provide the student with a basic understanding of the constitutional principles frequently encountered in the criminal justice profession. Landmark court decisions relating to due process, equal protection, unlawful arrest, unreasonable search and seizure, compulsory self-incrimination, the assignment of counsel and fair trial guarantees are discussed and critically evaluated. This course is part of the Liberal Arts American Politics Concentration and also may be taken as a Liberal Arts elective. (GCJC-201, 301 and Junior or Senior status required of GCJC students; GSSM-211 or GSSM-215 required of concentration students)
Class 3, Credit 4 (offered annually)

GCJC-505 White Collar Crime
Registration #0501-505
An examination of the extent and character of white collar crime with special emphasis upon business and professional deviance. (GCJC-201, 203) (GCJC third year or higher)
Class 3, Credit 4 (offered occasionally)

GCJC-506 Evidence
Registration #0501-506
This course is designed to provide the student with an awareness of what types of evidence are admissible in a criminal trial. The course includes a comprehensive analysis of the most frequently used types of evidence. There are readings and discussions pertaining to the nature of real, testimonial, hearsay, and circumstantial evidence. The course 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. (GCJC-201) (GCJC second year or higher)
Class 3, Credit 4 (offered periodically)

GCJC-507 Computer Crime
Registration #0501-507
This course examines the multifaceted issues associated with computer crime from a variety of perspectives. Topics include: techniques employed by offenders, etiology of behaviors, crime prevention, techniques of investigation, epidemiology, current and proposed legislation, civil/criminal statutory, and evidentiary issues. Computer crime, computer criminals, and victims are analyzed from a criminological foundation. (GCJC third year or higher)
Class 3, Credit 4 (offered periodically)
GCJC-510 Counseling in the Criminal Justice System
Registration #0501-510
This course is designed to instruct the student in the various accepted contemporary dynamics of interviewing and counseling criminal justice and related human service clients. Issues to be discussed will revolve around counseling and supervision strategies and conflicts among agencies, between administrators and staff, and clients. This course will present both the practical and theoretical aspects of these issues as well as devote attention to surveying prospective counseling strategies for accomplishing desired behavioral change. (GCJC-201) (GCJC third year or higher)
Class 3, Credit 4 (offered periodically)

GCJC-511 Alternatives to Incarceration
Registration #0501-511
The course analyzes possible sentencing options available to the criminal courts as well as pre-adjudicatory alternatives for both adults and juvenile offenders. The variety of dispositions evaluated include: probation, parole, halfway houses, work-release, study-release, prison furloughs, pre-trial release, pre-probation alternatives (fines, suspended sentences, conditional discharge, and a variety of diversion programs). Special emphasis is placed on a critical evaluation of the alternatives as they compare to the more traditional methods of handling offenders. Field trips and guest lecturers from non-traditional programs are typically included in the course. (GCJC-207, 411) (GCJC third year or higher)
Class 3, Credit 4 (offered occasionally)

GCJC-516 Court Administration
Registration #0501-516
A course designed to explore the management aspects of the court and court process. There is a focus on the structure of the several levels of court that typically exist in modern urban America. Related to this structure are the various other criminal justice agencies that interact with the court at various stages of the process. In addition, operational problems such as the bail process, record keeping, jury service and selection methods, and calendar management will receive significant attention. (GCJC fourth year)
Class 3, Credit 4 (offered occasionally)

GCJC-517 Comparative Criminal Law
Registration #0501-517
The course examines, in a comparative analysis, the criminal system and the penal methods of Europe and the United States. Major emphasis will be given to the issues of intent, criminal responsibility, individual and public interests, purposes and modes of prevention, repression and punishment, methods of trial, punishment and pardon. (GCJC-201) (GCJC third year or higher)
Class 3, Credit 4 (offered periodically)

GCJC-518 Criminal Justice/Community Relations
Registration #0501-518
This course examines the goals and objectives of agencies operating within, or directly related to, the criminal justice system in relation to mutual expectations, the community and the agency, in the delivery of services. Emphasis will be on intergroup responsibilities in exploring strategies to reduce conflict in the solving of public problems within the sphere of the criminal justice system. (GCJC-201) (GCJC third year or higher)
Class 3, Credit 4 (offered annually)

GCJC-520 Sentencing Process
Registration #0501-520
This course is intended to provide the student with a broad overview of the law of sentencing and the alternatives presently available in this area. Emphasis will be placed on the traditional methods of punishment now available in the courts, including, but not necessarily restricted to: fines, imprisonment, probation and suspended sentences. The course will also look to the power of the court in exercising its discretion in the sentencing process. (GCJC-201, 207, 304) (GCJC Senior status)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-522 Victimless Crime and the Law
Registration #0501-522
The course is designed to familiarize the student with many of the implications and ramifications of efforts to control "victimless" crimes. Course discussions concentrate on the illegal activity associated with prostitution, gambling, homosexuality, drug use and pornography. In this course the social, moral, legal and practical consequences of legalizing such activities are examined and evaluated. (GCJC-201, 203, 301) (GCJC Junior or Senior status)
Class 3, Credit 4 (offered occasionally)

GCJC-523 Crime and Violence
Registration #0510-523
This course focuses on the outbreak and increase of violent crime and criminal trends in the United States as one of the more serious realities in this century. In addition to an historical review, contemporary problems are explored, covering such topics as violence in the streets, terrorism, riots, vigilantism, and the role of various criminal justice agencies in attempting to control these problems. (GCJC-201) (GCJC Junior or Senior status)
Class 3, Credit 4 (offered occasionally)

GCJC-527 Seminar in Law
Registration #0501-527
This course will focus on the nature, function and limits of the rule of law. Attention will be paid to areas of substantive and procedural criminal law to illustrate the nature and limits of the idea of law. Readings will draw from both the classical and modern view of law. (GCJC-301, 304) (GCJC Senior status)
Class 3, Credit 4 (offered occasionally)

GCJC-528 Etiology of Crime
Registration #0501-528
This course is a comprehensive survey of the sociological, psychological, and psychiatric views of the etiology of crime and other forms of deviant behavior. With major emphasis on the sociological forms of explanation the course will undertake a historical review of criminality theory and progress to present-day concerns of both etiological origins. (GCJC-201, 203) (GCJC Senior status)
Class 3, Credit 4 (offered annually)

GCJC-529 Physical Security and Safety
Registration #0501-529
The course examines, through survey techniques, the complex problems confronting business and industry in the protection of assets. The use of electronic and non-electronic anti-intrusion systems and other hardware is examined and evaluated. Safety and accident prevention, health hazard prevention methods, and fire prevention and control are also examined. (GCJC-201) (GCJC Junior or Senior status)
Class variable, Credit variable (offered annually)
GCJC-530  Women and Crime  
Registration #0501-530  
This course will deal 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. The course also will examine the role of women as law enforcement officers, judges, lawyers, and correctional officers in the criminal justice system. (GCJC Junior or Senior status)  
Class 3, Credit 4 (offered annually)

GCJC-532  Retail Security  
Registration #0501-532  
This course provides an analysis of major security problems found within retail operations. Subjects examined include internal and external theft prevention and detection, shoplifting techniques, the use of undercover personnel and shopping services, security audit, and training of security and non-security personnel. Warehousing and cargo controls are examined. Emphasis will be placed upon methods, techniques and programs to protect assets. (GCJC Junior or Senior status)  
Class 3, Credit 4 (offered periodically)

GCJC-535  Security Management  
Registration #0501-535  
This course will focus on the management skills required in the security function and the corresponding administrative, legal and technical problems. Emphasis will be given to purchasing, cost benefit analysis, proprietary versus contract guard forces, personnel management and the relationship between security and non-security employees, and security awareness training programs. (GCJC Junior or Senior status)  
Class 3, Credit 4 (offered occasionally)

GCJC-536  Seminar in Security  
Registration #0501-536  
This course, designed for seniors completing criminal justice degree requirements with a concentration in security, will focus on critical issues, problems, and concerns in the area of security that are not otherwise covered directly or in depth in established security courses. Topics are expected to vary from offering to offering. (GCJC Junior or Senior status)  
Class 3, Credit 4 (offered occasionally)

GCJC-537  Legal Aspects of Security  
Registration #0501-537  
An examination of the federal and state case law and statutory provisions that regulate the private security field. The distinction between public and private enforcement; as well as the possible criminal and civil liabilities of private security personnel under the law of Willful Torts including: false arrest and imprisonment; nuisance; defamation; and invasion of privacy. (GCJC Junior or Senior status)  
Class 3, Credit 4 (offered occasionally)

GCJC-599  Independent Study  
Registration #0501-599  
A combined student/faculty member effort on a chosen topic beyond the normal sequence of course selections. It provides the qualified self-motivated student with a creative orientation, the opportunity to develop an autonomous and personal sense of academic growth and achievement.  
Class variable, Credit variable (offered annually)

Economics

The following courses are required for the BS degree. See listings under Service Course area for full course descriptions, unless otherwise indicated.

GSSE-301  Principles of Economics I  
Registration #0511-301

GSSE-302  Principles of Economics II  
Registration #0511-302

GECN-310  Managerial Economics  
Registration #0530-310  
A further elaboration of the elementary principles of economic analysis in Principles I and II. Particular emphasis will be placed on the application of these principles to the decision-making process of the firm. (GSSE-302)  
Class 3, Credit 4 (offered annually)

GECN-410  Applied Econometrics I  
Registration #0530-410  
This course is designed to provide students in the economics program with an opportunity to develop their skills in applied regression analysis. This course will cover the various regression models, estimation techniques, data preparation and transformation, and the interpretation of regression results. Particular emphasis on the dangers of misuse of regression techniques. (GECN-302, BBUQ-330, SMAM-226)  
Class 3, Credit 4 (offered annually)

GECN-411  Applied Econometrics II  
Registration #0530-411  
This course introduces students to one of the major functions contemporary economists perform—economic forecasting. Students will be exposed to alternative theories and the manner in which economists in both the private and public sector use these frameworks of analysis, data and quantitative methods to generate economic forecasts. (GECN-410)  
Class 3, Credit 4 (offered occasionally)

GECN-460  Math Methods: Economics  
Registration #0530-460  
This course develops the mathematical skills used by the applied economist in computer-based research. Exercises and research projects for the course will be chosen to illustrate the kind of problems actually dealt with by the contemporary applied economist. (GSSE-302, SMAM-226)  
Class 3, Credit 4 (offered occasionally)

GECN-501  Monetary Analysis and Policy  
Registration #0530-501  
This course is the study of monetary behavior and the role of monetary institutions in the modern economy. The course includes consideration of monetary theory, the development and current characteristics of monetary institutions in the American economy, and the use of the tools of monetary analysis to evaluate alternative monetary policies. The course will conclude with an evaluation of the neo-Keynesian and Monetarist positions. This course may also be taken as a Liberal Arts elective. (GSSE-302 or equivalent)  
Class 3, Credit 4 (offered annually)
GECN-505 Intermediate Microeconomic Theory
Registration #0530-505
This course helps develop the tools of analysis utilized in contemporary economics to study the process of price formulation in a capitalist society. Topics covered in the course include the theories of consumer behavior, cost and production, alternative market structures, and the pricing of factors of production. This course may also be taken as a Liberal Arts elective. (GSSE-302 or equivalent)
Class 3, Credit 4 (offered occasionally)

GECN-506 Intermediate Macroeconomic Theory
Registration #0530-506
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. This course may also be taken as a Liberal Arts elective. (GSSE-302 or equivalent)
Class 3, Credit 4 (offered occasionally)

GECN-510 International Trade and Finance
Registration #0530-510
This course introduces the students to the theory and the practical issues of the export/import markets, the international flow of capital, and international investment decisions. In addition, the students study the foreign-exchange and the Eurodollar markets and the investment opportunities in them. The role of multinational corporations in international trade and finance is also discussed. (GSSE-301 and GSSE-302 or equivalent)
Class 3, Credit 4 (offered occasionally)

GECN-520 Industrial Organization
Registration #0530-520
This course is the study of the structure, conduct, and performance of contemporary American industry. The course 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. (GSSE-302 or equivalent)
Class 3, Credit 4 (offered occasionally)

GECN-550 Seminar in Applied Economics
Registration #0530-550
A senior-level course emphasizing applications of economic analysis and quantitative methods to economic decision-making. Cases will be drawn from both the private and public sectors of the economy. (Limited to BS in economics and economics degree seniors)
Class 3, Credit 4 (offered occasionally)

Professional and Technical Communication

The following courses are required for the BS degree. See listings under Language and Literature for full course descriptions, unless otherwise indicated.

GPTC-200 Foundations of Communication
Registration #0535-200
This course is first an introduction to the theoretical and conceptual underpinnings of oral, visual and written communication. The course introduces basic communication models, the role of language in communication, symbols and symbolmaking, issues of audience analysis, and the development of different modes of discourse. Foundations also explores the history of communication. Finally, the course introduces students to basic research in communications studies.
Class 3, Credit 4

GPTC-210 Interpersonal Communication
Registration #0535-210
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 interpersonal relationships. Required course.
Class 3, Credit 4 (offered occasionally)

GPTC-221 Public Presentations
Registration #0535-221
The development of formal public speaking techniques as an aid to self-confidence in modern social and business situations. Weekly practice talks with emphasis on organization, clarity, vocal expression, and poise.
Class 3, Credit 4

GPTC-230 Written Argument
Registration #0535-230
This course develops reasoning and advanced language skills needed to carry out applied logic and applied problem-solving writing processes. Required course. (GLLC-220)
Class 3, Credit 4 (offered annually)

GPTC-300 Group Communication and Problem Solving
Registration #0535-300
Basic theories of problem-solving techniques in small group meetings. Focus on leadership, participation, types and functions of problem solving, and informational groups. Student participation, in leading, participating in, and evaluating various conference groups. This course is required and restricted to GPTC majors. (GPTC-200)
Class 3, Credit 4

GPTC-310 Conference Techniques
Registration #0535-310
Basic theories of conference techniques including leadership, participation, types, and functions of public and private conferences and their evaluations. Student participation in training, problem solving, and informational-developmental conferences. Required course. (GPTC-200)
Class 3, Credit 4 (offered quarterly)
The majority of this course is conducted via computer conferencing. Professional elective. (ICSA-200, GPTC-310)

This course examines interactive electronic communications on human interaction, methods of management, and organizational processes. Students are required to engage in frequent interaction, perform research, and manage actual conferences. Professional elective. (GPTC-200, 210, 221, 300)

This course examines dyadic communication as it occurs in the organizational, professional interviewing context. Emphasis is on the major types of interviews: informational, selective, and persuasive. Students are provided with theory, as well as opportunities for skills development. Professional elective. (GPTC-200)

This course examines both interpersonal and small-group communication in organizational settings. Topics include information flow and networks, organizational theory, managerial decision making, interviewing, organizational development, and conflict resolution. Professional elective. (GPTC-316)

This course blends classical and modern public address theory in an attempt to produce the speaker who is both wise and eloquent. The course focuses on ideas—how to invent, arrange, stylize and deliver them. Attention is given to the creative use of language, special-occasion speeches, speaking in front of a camera, and the ethics of public speaking. Professional elective. (GPTC-220)

An introduction to the study of public relations. Topics include history, research areas, laws, ethics, and social reponsibilities as they relate to the theory and practice of public relations. This course is a professional elective for GPTC students. (GPTC-200, 230)

This course examines interactive electronic communications technologies (teleconferencing) used in a growing number of organizations. Emphasis is on the effects these technologies have on human interaction, methods of management, and organizational processes. Students are required to engage in frequent interaction, perform research, and manage actual conferences. The majority of this course is conducted via computer conferencing. Professional elective. (ICSA-200, GPTC-310)

This course is an introduction to human communication theory, including a history of the major stages in development of modern theories of communication. Theories based both in the humanities and the social sciences will be covered. Required course. (GPTC-316)

This course examines communication processes and principles that use the visual mode. Through a survey of the several areas represented in the literature of visual communication, this course examines theories, analysis, and sender and receiver orientations to images. Emphasis is on communicative understanding rather than on the aesthetic, technical or skills approach. Discussion will primarily depend on, but will not be limited to, the photographic image. Required course. (GPTC-200, 210)

This course is on the history, development and law and regulation of communication. This course is part of the Language Concentration and may also be taken as an elective. (GLLC-220 or equivalent)

This course examines both interpersonal and small-group communication in organizational settings. Topics include information flow and networks, organizational theory, managerial decision making, interviewing, organizational development, and conflict resolution. Professional elective. (GPTC-316)

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This course examines both interpersonal and small-group communication in organizational settings. Topics include information flow and networks, organizational theory, managerial decision making, interviewing, organizational development, and conflict resolution. Professional elective. (GPTC-316)
GPTC-490  Persuasion and Social Change  
**Registration #0535-490**  
Reading and analysis of selected public speeches and essays advocating or opposing major issues of social change in the United States from the 18th century through contemporary advocacy. Professional elective for GPTC students. This course is part of the Peace Studies Concentration and also may be taken as an elective. (GPTC-325)  
Class 3, Credit 4 (offered occasionally)

GPTC-501  Effective Speaking  
**Registration #0535-501**  
The development of formal public speaking techniques as an aid to self-confidence in modern social and business situations. Weekly practice talks with emphasis on organization, clarity, vocal expressions, and poise.  
Class 3, Credit 4 (offered quarterly)

GPTC-520  Intercultural Communication  
**Registration #0535-520**  
This course is an examination of the role of culture in face-to-face interaction. Students may find a basic background in communication, anthropology or psychology useful. Professional elective. (GPTC-200)  
Class 3, Credit 4 (offered occasionally)

GPTC-525  Special Topics in Communication  
**Registration #0535-525**  
A focused, in-depth study and analysis of a selected advanced topic in communication and associated issues. Specific topic will vary according to faculty assigned and will be published when the course is offered. Topics include: semiotics, public relations, communication technologies, gender differences in communication, legal communication, and censorship and propaganda. Professional elective. (For junior and senior PTC students; non-PTC students must receive permission of the instructor) (GPTC-200)  
Class 3, Credit 4 (offered occasionally)

GPTC-532  Professional Writing  
**Registration #0535-532**  
This course develops in the student those professional writing skills necessary to the composition of in-house journals or newsletters; press releases; trade journals/books; speeches; general-interest writing; and ghost writing. Students enrolling in the course should have command of clear and logical standard written English prose. Required course. (GPTC-200, 230)  
Class 3, Credit 4 (offered annually)

GPTC-550  Film and Society  
**Registration #0535-550**  
An inquiry concerning the relationship between motion pictures and society that will use historical, humanistic, and social science research to achieve an understanding of movies as a social force, industry and art form. Professional elective. (GPTC-350)  
Class 3, Credit 4 (offered occasionally)

GPTC-595  Senior Thesis in Communication  
**Registration #0535-595**  
Senior Thesis is a guided research seminar culminating in a major project that brings communication studies and substantive work in the technical studies area together. The course focuses on designing, conducting and completing an independent research project. The progress of each project will be shared with the class for discussion and critiques. Required course. (GPTC-445)  
Class 3, Credit 4 (offered quarterly)

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**Social Work**

**Core Courses**

GSWS-210  The Professional Social Work Role  
**Registration #0516-210**  
This course explores social work as a profession, the various fields in which social workers practice and the differing philosophies of human services and social work approaches. Also covered are strategies for developing self-awareness and professional self-assessment.  
Class 3, Credit 4 (F)

GSWS-212  Self-Awareness in the Helping Role  
**Registration #0516-212**  
This course helps to develop students' helping skills in essentially three broad areas: 1) Skills in noticing or observing; 2) Observing one's professional use of self in the helping relationship and evaluating the appropriateness of such behavior; and 3) Observing the client and evaluating the effect one's response has on her/him.  
Students are expected and required to increase their awareness skills, and this course offers a unified learning experience where students can concentrate on the theory and practice of awareness skills. (GSWS-210)  
Class 3, Credit 4 (F,W)

GSWS-302  History of Social Welfare  
**Registration #0516-302**  
This course is designed to acquaint the student with the historical roots of our present system of social welfare, emphasizing its development in the United States, and the concurrent development of social work as a profession. It will examine the value bases and the economic, social and political factors of each era as reflected in the social welfare programs of that time and their effects on people. (GSWS-217)  
Class 3, Credit 4 (F)

GSWS-305  Structure and Function of Social Welfare  
**Registration #0516-305**  
Examines the provision of current social services in five major fields of social welfare: public welfare, traditional voluntary agencies, voluntary social movements, mental health and the legal system. Course also will explore organization theory as it applies to the structure of these services, as well as major patterns and sources of funding. (GSWS-302 or concurrent)  
Class 3, Credit 4 (W)
This two-course sequence is designed to give students a basic understanding of human development over the entire life cycle. Students will study the biological, psychological, social, and environmental aspects of development during the prenatal period, infancy, childhood, adolescence, young adulthood, middle adulthood, and later adulthood. This individual development will be placed in the context of the developmental family life cycle and the ecological perspective of social work practice. Attention will be given to effects of racism, poverty, and discrimination on the development of individuals in our society. Changing gender roles, sexism, and sexual orientation will be discussed extensively. Attention will also be given to human diversity and to differences in sexual orientation in the second course.

The two courses in the sequence form the foundation on which further courses in the curriculum build and, with these courses, form the knowledge base for the social work practice courses. The conceptual approach used includes ecological systems theory and the family life cycle model.

Class 3, Credit 4

GSWS-357 Mental Health and Mental Illness
Registration #0516-357 From a Social Work Perspective
This course is designed to give social work students a basic understanding of mental health, mental illness, and mental retardation from a social work perspective. The role of the social worker in working with individuals and their families will be included. Students will be given a general understanding of our current mental health systems. The medical model and alternative systems of diagnosis are considered. (GSWS-302, 354, 355, GSWS-P210)

Class 3, Credit 4 (offered every year)

GSWS-405 The Family from a Social Work Perspective
Registration #0516-405
This course is designed to give the social work student a basic understanding of the family as client. Students will gain an understanding of the family dynamics and the choices and decisions about family life that are required in contemporary society. A major focus of the course is the family throughout its natural life cycle and areas of potential problems during its development when social work intervention may be beneficial. Students will also learn about changes which can affect the family such as divorce, single-parenthood, remarriage, AIDS, death in the family, alcoholism, and family violence. Also included are the influences currently affecting contemporary American families such as social class, racism, ethnicity, poverty, and the changing status of women. (GBSP-210, GSWS-354, 355)

Class 3, Credit 4 (W)

GSWS-435 Computer Applications to Social Work Research
Registration #0516-435
Introduction to the methodology of research in behavioral and social sciences. Emphasis will be on an introduction to bibliographic search procedures, becoming a practitioner/researcher, evaluation of one's own professional practice, formulation of research, the environmental contexts of research, ethics and confidentiality, research methods and design, sampling, measurement, validity, reliability, indexes, scales, instrument design and basic descriptive statistics. Instruction, practical demonstration and hands-on experience are provided in computer applications ranging from electronic communication including submission of assignments, storage of information, text formatting, ethics and confidentiality of electronically stored information, data processing and report writing. (SMAM-204, CTAM-361)

Class 3, Credit 4 (offered quarterly)

GSWS-456 Group Theory in Social Work
Registration #0516-456
This course covers the theoretical foundations of group dynamics and group behavior within the context of social work. Such concepts as types of groups (prevention, rehabilitation), group decision-making, affection), program, leadership, communication, structure and modes of intervention are covered. The course provides the knowledge and initial experiential base for the development of practice skills in working with groups. (GSWS-354, 355, third-year standing)

Class 3, Credit 4 (F)

GSWS-465 Assessing Community Needs
Registration #0516-465
A study of assessment techniques for identifying the strengths and weaknesses of services provided within a community. Involves analysis of data using a computer statistical package. Topics covered include program evaluation, quality assurance procedures and community networking. Attention will be given to programs for minority groups, the disabled, the elderly, youth, persons with mental health problems and other special populations. (GSWS-405, 456, third-year standing)

Class 3, Credit 4 (S)

GSWS-475 Interviewing and the Helping Relationship
Registration #0516-475
This course is the first in a three-year course sequence offered concurrently with laboratory or field instruction dealing with generalist social work practice. All three courses emphasize the differential use of social work techniques (e.g., interviewing skills, assessment, data-collection and problem-solving) and intervention skills in a variety of client systems.

Through lectures, discussions, reading, lab simulations and case analysis, it is the overall objective of the sequence to provide the student with the knowledge, skill and self-awareness for beginning professional social work practice. The development of this knowledge, skill and awareness is seen as a progressive process underlying the three-course sequence. (GSWS-405, 456)

Class 3, Credit 4 (S)

GSWS-505 Assessment and Problem Solving
Registration #0516-505
See GSWS-475 (GSWS-435, 465, 475; corequisite with GSWS-506, 527, 535)

Class 3, Credit 4 (F)

GSWS-506 Field Instruction I
Registration #0516-506
Field Instruction I and II comprise a 20-week, 30-hour per week supervised field placement. Under the guidance of an instructor the student is placed in a cooperating social, governmental, health or educational agency in order to gain direct experience with its organization, programs and client services. Closely supervised work at the agency is supplemented by seminars designed to integrate theory and practice. (GSWS-435, 465, 475; corequisite with GSWS-505, 527, 535)

Field 300, Credit 5 (F)
GSWS-535 Advanced Social Work Research  
Registration #0516-535  
This is the first of a two-course sequence in which students will conduct research on one or more aspects of professional social work practice during their concurrent field experience. Students will use information learned from their first social work computer research course and their statistics courses. The continued use of the computer as a research tool will be studied, with emphasis on the application of MINITAB and SPSS-X. Specific research designs and statistical analyses applicable to data generated during field work experience will be reviewed. Major focus will be on idiographic “single subject” design research and a review of quantitative research, Chi-square, PPMCC, Spearman’s rho, T-test, ANOVA, and qualitative analyses popular in social work research. (CTAM-361)  
Class 3, Credit 2 (F)

GSWS-540 Evaluation of Practice  
Registration #0516-540  
This is the second of a two-course sequence and will be built on material learned in Advanced Social Work Research and its prerequisite. Students will learn about baseline assessments, the ethics of research, and experimental research. They will also learn about report writing, grant writing, and the politics of research. Also, concerns and issues in research with special populations and cross-cultural research will be explored. (CTAM-361)  
Class 3, Credit 2 (W)

GSWS-550 Social Intervention  
Registration #0516-550  
See GSWS-475 (GSWS-505, 506, 527, 535; corequisite with GSWS-551, 560)  
Class 3, Credit 4 (W)

GSWS-551 Field Instruction II  
Registration #0516-551  
See GSWS-506 (GSWS-505, 506, 527, 535; corequisite with GSWS-540, 550, 560)  
Field 300, Credit 5 (W)

GSWS-552 Field Seminar I  
Registration #0516-552  
This is a practicum seminar taken during the first quarter of field instruction. Students and instructor will discuss topics related to field experiences and concerns. The seminar will study the supervisory process and topics to be analyzed will include: staff structure; work loads and distribution; the responsibilities of supervisor and supervisee; the ethics of supervision and professional growth.  
This practicum is taken concurrently with Field Instruction I, Assessment and Problem Solving, and Advanced Social Work Research. It is intended to help students integrate field experiences with their pre-field course content and the concurrently taken courses. (GSWS-435, 465, 475; corequisite with 412, 421, 535)  
Class 3, Credit 4 (F)

GSWS-553 Field Seminar II  
Registration #0516-553  
A weekly seminar, taken during the second quarter of field placement, in which students continue to read, write, think about and discuss issues directly related to their field practice and social work education. Continuing with the work of the first quarter seminar for field students, this course will focus on students’ experiential and professional needs. Community service agency management issues will be explored; for example, the management of human resources through supervision, "accountability" and "termination" issues, and how they relate to agency morale and human service delivery.  
The seminar is taken concurrently with Field Instruction II, Social Intervention, and Evaluation of Practice. All three courses share common objectives as well as the study of the Social Work Competencies and the generalist practice model. Effort will be made by faculty to ensure that students in the field education sequence successfully integrate course content and objects. (GSWS-505, 506, 527, 535; corequisite with GSWS-540, 550, 551)  
Class 3, Credit 4 (W)

GSWS-555 Policy and Planning Processes  
Registration #0516-555  
For social work students who have completed field instruction. Course will explore the development of social welfare services as it proceeds from the determination of social need through program design to implementation. Concepts of policy process, large system change, and grant and proposal writing are considered. (GSWS-550, 551, 560)  
Class 3, Credit 4 (S)

GSWS-558 Professional Seminar  
Registration #0516-558  
For social work students who have completed field instruction. Purpose of this course is to serve as a capstone in the student's social work education and to facilitate the integration of all content areas in the curriculum. This integration is achieved through presentations by faculty, practitioners and invited experts in order to cover the interrelationships between values and ethics of the profession; human behavior and the social environment; needs assessment and research techniques; methods of intervention; and policy, planning and funding processes. This integration is demonstrated by students through a major paper, which combines these areas with the student's chosen field of application, using a primary, secondary and tertiary prevention approach for a specifically shown target population-at-risk and underserved populations. (GSWS-550, 551, 560)  
Class 3, Credit 4 (S)

Professional Elective Courses

GSWS-314 The Social Worker as Advocate  
Registration #0516-314  
This course will examine the role of social workers in advocating with and on behalf of clients and others for negotiating or bringing about needed change in institutions or policies of our society. Discussion of the forces in the social, economic and political environment today that directly affect poverty, racism and other issues will be related to examining techniques for achieving change.  
Class 3, Credit 4 (offered on sufficient demand)
GSWS-321 Alcoholism: Interventive Skills and Techniques
Registration #0516-321
Teaches a variety of interventive skills used by those giving care to alcohol abusers, their families and communities. Emphasis is on the method of use of these skills. Role play, videotaping and case study will be included. (GSWS-302, GSHH-493, GBSP-210, 440, GBSS-210, 526, 527, SBIG-211, 212)
Class 3, Credit 2 or 4 (every other year)

GSWS-330 Rural Social Services
Registration #0516-330
The course will identify the historical development, cultural makeup, family lifestyles and work habits of the nation's migrant population and the rural poor. The course will examine and critically analyze the differences between migrants and the rural poor and compare them to the characteristics of the urban poor found in contemporary American cities. The course considers governmental rural policies and service-delivery systems directed to the rural areas which reflect the economic, political and social conditions during the time they were developed. The skills of generalist social work as applied in the rural setting are compared to application in urban settings.
Class 3, Credit 4 (offered on sufficient demand)

GSWS-340 Deafness: Fundamental Aspects
Registration #0516-340
This course is designed to provide the student with a basic understanding of deafness. The overview includes how we hear, techniques for diagnosis, the etiology of deafness, as well as a historical perspective on how education for the deaf has developed with its various philosophies. Language acquisition and modes of communication are explored, as well as the social, psychological and vocational development of deaf persons.
This is the first course in a sequence that will provide a knowledge base for the development of generalist social work practice skills. (GSWS-302, 455, GSSP-210, 440, 442)
Class 3, Credit 4 (W)

GSWS-342 Deafness: Intervention Strategies
Registration #0516-342
The purpose of this course is to build skills in applying the knowledge base developed in the prerequisite course to case situations. Students demonstrate collection and recognition of pertinent information, and development and implementation of appropriate intervention plans. Legal and political issues, as well as methods of assessing local resource networks, are considered. Professional roles and intervention goals are discussed as they relate to interfacing systems, including individual, family, school, medical, mental health, rehabilitation and employment. (GSWS-340)
Class 3, Credit 4 (every other year)

GSWS-360 Social Work with the Disabled
Registration #0516-360
This course provides an examination of the psychosocial aspects of disabilities, the course emphasizes the effects of disability on the individual's development and functioning and the accompanying stress on the family and society in attempts to respond to her/his needs. Interventive strategies and critical times for intervention by the social worker are examined. (GSWS-302, 455, GSSP-210, 440,442)
Class 3, Credit 4 (S, every other year)

GSWS-370 Child Protective Services
Registration #0516-370
This course examines the concepts and knowledge base of child abuse and neglect. Topics will include: definition of abuse and neglect; a historical perspective; possible causes and effects of abuse; intervention strategies; statutes and legislation; preventive approaches; child abuse services in New York State; provision of service; role of the social workers; and future concerns in this problem area. (GSWS-302, 455, GSSP-210, 440, 442)
Class 3, Credit 4 (offered on sufficient demand)

GSWS-380 Social Work and the Law
Registration #0516-380
This course provides the student with the opportunity to develop a workable vocabulary and understanding of some of the basic legislative processes and laws that affect the practice of social work. Focus centers around significant issues and points of law that have affected the delivery of services. (GSWS-302, 455, GSSP-210, 440, 442)
Class 3, Credit 4 (offered on sufficient demand)

GSWS-390 Alcohol and the Family
Registration #0516-390
This course is designed to give students and practitioners in the various fields of addiction a view of the myriad interconnections between alcohol and substance abuse, eating disorders, post-traumatic stress disorder, and mental health. This wide perspective on poly addiction will also take into consideration ACOAs and EAP and the assessment, treatment, evaluation, and consequent training required of professionals in the field.
Class 3, Credit 4

GSWS-441 Alcoholism and Sexual Dysfunction
Registration #0516-441
This course is designed to provide the student with a basic understanding of human sexuality and its relationship to alcohol abuse and chemical dependency. It will give the student exposure to skills needed in taking a sexual history in an alcoholism treatment facility and to referral sources for the patient.
Class 3, Credit 4

GSWS-442 Poly Addiction
Registration #0516-442
This course is designed to give students and practitioners in the various fields of addiction a view of the myriad interconnections between alcohol and substance abuse, eating disorders, post-traumatic stress disorder, and mental health. This wide perspective on poly addiction will also take into consideration ACOAs and EAP and the assessment, treatment, evaluation, and consequent training required of professionals in the field.
Class 3, Credit 4

GSWS-455 Contemporary Issues in Social Work
Registration #0516-455
This course is designed to offer students an opportunity to examine and discuss contemporary issues in the field of social work. Course content will vary from quarter to quarter depending on current issues and student interest. Areas related to expressed student interest, family expertise and developments in the field will be examined. (GSWS-302, GSSP-210,440,442)
Class 3, Credit 4 (offered on sufficient demand)
GSWS-509 Services for Children and Their Families
Registration #0516-509
This course is designed to give social work students a beginning knowledge of social work services to children and their families. Specific services included are preventive services, homemakers, day care, protective services, foster care, adoption, unmarried parents, institutional care and mental health services. The development of each type of service will be discussed, as well as the reasons why each service is needed and for what type of situation. The social worker's role in each area will also be considered. (GSWS-302, 354, 355, GBSP-210)
Class 3, Credit 4 (every other year)

GSWS-512 Advanced Intervention with Individuals
Registration #0516-512
This course builds upon the knowledge base of generalist social work practice and develops students' understanding of the specific way in which these concepts and theories are applied in social intervention with individuals. Use will be made of case studies and role playing to further develop the students' skills in this area. (GSWS-550, 551, 560)
Class 3, Credit 4 (offered on sufficient demand)

GSWS-513 Advanced Intervention with Families
Registration #0516-513
This course is for students who have completed the practice sequence and field instruction, and have learned the theories and concepts of generalist social work intervention. This course builds on that knowledge base and develops the students' understanding of the specific ways in which these concepts and theories are applied in intervention with families. (GSWS-550, 551, 560)
Class 3, Credit 4 (offered on sufficient demand)

GSWS-522 Advanced Intervention in Communities
Registration #0516-522
This course examines community intervention as a social work method. The roles and functions of the community intervention practitioner and alternate methods of practice are analyzed, such as locality development, social planning and social action. The course will investigate specific applications of community intervention theory to political influence processes, coalition, neighborhood associations and regionalization. (GSWS-550, 551, 560)
Class 3, Credit 4 (offered on sufficient demand)

GSWS-523 Advanced Intervention with Groups
Registration #0516-523
This course examines social treatment as one form of group work practice. There are different service procedures and approaches which may be applied to client groups, and each may have utility in pursuing distinct service objectives. The course will investigate the scope, techniques and functions of generalist social work practice in such diverse settings as social service agencies, business, correctional institutions and communities. (GSWS-550, 551, 560)
Class 3, Credit 4 (offered on sufficient demand)

GSWS-525 Grant Writing
Registration #0516-525
This course is designed to provide the student with a series of readings and experiential exercises necessary for writing a grant proposal. Focus will be on funding sources which provide money for social welfare programs and for research into social work. (GSWS-302, 354, 355, GBSP-210)
Class 3, Credit 4 (offered on sufficient demand)

GSWS-536 Aging and Society
Registration #0516-536
This course considers concepts, issues and research techniques in the behavioral and biological aspects of aging. It examines the interaction of group processes in the family and community which influence society's attitudes toward the aging process. It further examines the culture, environmental and institutional changes as they relate to an increasing population of older people. (GSWS-302, 354, 355, GBSP-210) (May also be taken for liberal arts elective credit under GBSS-508)
Class 3, Credit 4 (offered on sufficient demand)

GSWS-537 Social Policy and the Aging
Registration #0516-537
This course will be organized around culture and values as the context for policy formulation. Special attention will be given to the process of policy analysis and implementation. Several specific policy areas will be examined: social security and income maintenance; health and long-term care; work and retirement; social services and the aging network; housing and living arrangements for the elderly; and the role of the family and the elderly. (GSWS-302, 354, GBSP-210) (May also be taken for liberal arts elective credit. See GBSS-515.)
Class 3, Credit 4 (offered on sufficient demand)

GSWS-538 Family Violence
Registration #0516-538
This course is designed to acquaint social work students and practitioners with the problem of family violence. The causes and dynamics of various forms of violence in the family will be addressed. These include: child abuse, incest, spouse abuse, sibling violence, marital rape, abuse of parents by adolescents, and the abuse of the elderly by their adult children. Factors affecting intervention in families where these occur and techniques for intervention will be included. (GSWS-302, GSHH-493, GBSP-210, GBSS-210, 526, 527, SBIG-211, 212)
Class 3, Credit 4 (offered on sufficient demand)

GSWS-539 Services for the Aging
Registration #0516-539
This course deals with the variety of existing community-based services available for the elderly. The course also examines the tactics, assessment, coordination and evaluation of various direct and indirect services for the elderly. Particular attention will be given to such service groups as nursing homes, home health care, mental health and other formal and informal support systems. (GSWS-302, 354, 355, GBSP-210)
Class 3, Credit 4 (offered on sufficient demand)

GSWS-599 Independent Study
Registration #0516-599
A combined student/faculty effort on a chosen topic beyond the normal course selections. It provides the self-motivated student with a creative orientation, the opportunity to develop an autonomous and personal sense of academic growth and achievement. Independent Study may include independent work in an agency setting or other field work away from the Rochester area. Credit variable (F, W, S, SR)
GLLC-220  English Composition
Registration #0502-220
This course develops the language skills needed to write effectively. It should be taken in the freshman year.
Class 3, Credit 4 (offered quarterly)

GLLC-443  Writing and Thinking
Registration #0502-443
This course develops the reasoning and advanced language skills needed to carry out applied logic and applied problem-solving writing processes. This course is part of the Language Concentration and may also be taken as an elective. (GLLC-220 or equivalent)
Class 3, Credit 4 (offered annually)

GLLC-444  Technical Writing
Registration #0502-444
This course develops in students those skills necessary for completing technical writings tasks, such as instructional memos; letters of inquiry; reports (trip, progress/status, accident, research, feasibility); problem analyses; specifications; flow charts; technical manuals. Students enrolling in Technical Writing should have command of clear and logical standard written English prose. This course is part of the Language Concentration and may also be taken as an elective. (GLLC-220 or equivalent)
Class 3, Credit 4 (offered annually)

GLLC-445  History of the English Language
Registration #0502-445
What makes the English language so difficult? Where do our words come from? Why is it a challenge for native speakers to master English grammar? This course surveys the development of the English language from its beginning to the present to answer such questions as these about the nature and flexibility of the English language. This course is designed for anyone who is curious about the English language. This course is part of the Language Concentration and also may be taken as an elective. (GLLC-220 or equivalent)
Class 3, Credit 4 (offered annually)

GLLC-446  Advanced Technical Writing
Registration #0502-446
This course develops in students those skills necessary for designing, writing and editing long technical documents, such as final reports and manuals. Special emphasis is given to computer-designed graphics and page layout. Students enrolling should have command of concise English prose. (This course will be taught with a Macintosh microcomputer.) This course is part of the language concentration and may also be taken as an elective. (GLLC-220 or equivalent)
Class 3, Credit 4 (offered quarterly)

GLLC-448  The English Language:
Contemporary Structure
Registration #0502-448
This course introduces students to the morphology and syntax of contemporary English. Students will develop a grammar sufficient for describing the basic structures of the English language, and they will examine a variety of social and regional dialects of contemporary English. In doing so, they will learn basic principles of grammatical description and consider the uses—and the abuses—of prescriptive grammars. The course is recommended for anyone who has either a professional or a personal interest in understanding how English works. It is part of the Language Communication Concentration and may also be taken as an elective. (GLLC-220)
Class 3, Credit 4

GLLC-516  Creative Writing/Poetry
Registration #0502-516
An exploration of the techniques of writing poetry in both open and closed forms. (GLLC-220 or equivalent)
Class 3, Credit 4 (offered annually)

GLLC-517  News Writing
Registration #0502-517
Practicum in basic techniques of news writing and gathering for the daily press. Emphases will be primarily on writing for the print media and on frequent writing against a deadline.
Class 3, Credit 4 (offered annually)

GLLC-518  Creative Writing/Prose Fiction
Registration #0502-518
An exploration of some of the most important contemporary techniques of prose fiction in the short story form. This is a writing elective for the Professional and Technical Communication Program and also may be taken as a liberal arts elective. (GLLC-220 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLC-519  Advanced Creative Writing
Registration #0502-519
Students who have completed Creative Writing or who have satisfied the instructor, normally by presentation of a writing sample, of their readiness to undertake the course will be given an opportunity to explore in depth a literary genre, subject or theme chosen by the individual student in conference with the instructor. The acceptability of the student's project will be determined on the basis of intrinsic literary merit and its potential value to the student's development as a writer. (GLLC-220 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLC-524  Communication and Documentary Film
Registration #0502-524
An examination of the documentary film and video as case studies in communication media. The course focuses on film techniques used as argument, persuasion, propaganda and reconstruction of reality. Such elements as director, subject, shooting style, and editing techniques will be analyzed in terms of message, purpose and audience.
Class 3, Credit 4 (offered annually)

GLLC-553  Creative Interpretation in Sign
Registration #0502-553
Creative approaches to the interpretation of selected literary classics (prose, poetry, fiction, drama) through the visual medium of sign language and sign-mime. (Sign language)
Class 3, Credit 4 (offered occasionally)
GLLF-400, 440-41  American Sign Language
Registration #0503-400,440-41  I, II, III
This course presents a study of the origins, nature, and development of American Sign Language (ASL), and its variants, as used by the deaf population of North America. Integral to the course is the linguistic structure of ASL and the nature of signing as a linguistic modality. These courses are not part of any concentration.
Class 3, Credit 4 (offered annually)

GLLF-405,445-49  Beginning Arabic I, II, III
Registration #0503-405, 445-49  IV, V, VI
This sequence of courses is offered in a modified, self-instructional format developed by the National Association of Self-Instructional Language Programs (NASILP). The College of Liberal Arts is certified by NASILP and uses course material and examiners accredited by NASILP.
These courses will introduce students with no prior exposure to the language to modern standard Arabic. Arabic I will introduce the phonology and script. Throughout, the emphasis will be on acquiring oral skills. These courses are not part of any concentration. (Permission of the foreign language coordinator)
Class 2, Credit 4 (offered annually)

GLLF-408, 451-55  Beginning Chinese I, II, III
Registration #0503-408, 451-551  IV, V, VI
This sequence of courses is offered in a modified, self-instructional format developed by the National Association of Self-Instructional Language Programs (NASILP). The College of Liberal Arts is certified by NASILP and uses course material and examiners accredited by NASILP.
These courses will introduce students with no prior exposure to the language to elementary spoken Mandarin. The Chinese writing system will be introduced in Chinese III. Courses II and III are part of the Foreign Language/Culture Concentration and may also be taken as electives. (Permission of the foreign language coordinator)
Class 2, Credit 4 (offered annually)

GLLF-464,465  Beginning French II, III
Registration #0503-464, 465
This sequence of courses is designed to give students with one or two years of high school French a sound basic knowledge of French as it is spoken and written today. A strong emphasis is placed on speaking and reading skills. Besides language, students will also study contemporary life and culture in the French-speaking countries. These courses are not part of any concentration.
Class 4, Credit 4 (offered annually)

GLLF-466,467,468  Intermediate French I, II, III
Registration #0503-466, 467,468
This sequence of courses at the intermediate level is designed to give students more advanced practice in the skills of speaking, reading, comprehension, and writing French. The courses also include segments of the use of French for business. Besides language, students will study contemporary life and culture through a variety of carefully selected readings. Although these courses are part of a six-course sequence, they may be taken separately. This intermediate sequence is part of the language requirement for International Business majors.
Class 4, Credit 4

GLLF-474,475,476  Intermediate German I, II, III
Registration #0503-474, 475, 476
This sequence of courses at the intermediate level is designed to give students advanced practice in the skills of speaking, reading, comprehension, and writing German. The courses also include segments of the use of German for business. Besides language, students will study contemporary life and culture through a variety of carefully selected readings. Although these courses are part of a six-course sequence, they may be taken separately. This intermediate sequence is part of the language requirement for International Business majors.
Class 4, Credit 4

GLLF-490,492,494  Intermediate Spanish I, II, III
Registration #0503-492, 490, 491
This sequence of courses at the intermediate level is designed to give students more advanced practice in the skills of speaking, reading, comprehension, and writing Spanish. The courses also include segments of the use of Spanish for business. Besides language, students will study contemporary life and culture through a variety of carefully selected readings. Although these courses are part of a six-course sequence, they may be taken separately. This intermediate sequence is part of the language requirement for International Business majors.
Class 4, Credit 4
GLLL-332 Literature
Registration #0504-332
The students study some of the great literary works of our culture to enrich their lives and reinforce their analytical abilities. The students read representative poems, dramas, and narratives drawn from the Ancient, Medieval-Renaissance, and Modern Periods.
Class 3, Credit 4 (offered annually)

GLLL-440 Drama/Theatre
Registration #0504-440
Drama/Theatre studies drama as a genre and theatre as a performing art. Intensive study of at least one major playwright or period complements a general survey of drama/theatre from ancient Greece to modern Broadway. This course is part of the Literature Concentration and may also be taken as an elective. (GLLL-332 or equivalent)
Class 3, Credit 4 (offered annually)

GLLL-441 The Art of Poetry
Registration #0504-441
This course emphasizes the enjoyment and study of poetry with primary attention to major poetry in English. This course is part of the Literature Concentration and may also be taken as an elective. (GLLL-332 or equivalent)
Class 3, Credit 4 (offered annually)

GLLL-442 Short Story
Registration #0504-442
The course is a study of a collection of short stores with critical commentary in order to provide source materials on the nature and development of this genre. The course is part of the Literature Concentration and may also be taken as an elective. (GLLL-332 or equivalent)
Class 3, Credit 4 (offered annually)

GLLL-443 The Novel
Registration #0504-443
The Novel provides a close reading and analysis of several novels selected to show the range of narrative techniques, methods of characterization and plot construction, and styles representative of the genre. This course is part of the Literature Concentration and may also be taken as an elective. (GLLL-332 or equivalent)
Class 3, Credit 4 (offered annually)

GLLL-444 Film as Literature
Registration #0504-444
This course examines the nature of narrative in both film and literature, the various aspects of adaptation of literature into film, and the relationship between social reality and storytelling in documentary film. This course is a non-technical, non-chronological study of film with a balance of roughly 50% literature and 50% film. This course is part of the Literature Concentration and may also be taken as an elective. (GLLL-332 or equivalent)
Class 3, Credit 4 (offered annually)

GLLL-445 Great Authors
Registration #0504-445
This course provides extended study of the works of specific great authors (listed in the course titles that follow). Students can take any section of this course as part of the Literature Concentration or as an elective. Additional sections also can be taken for the Literature Concentration or elective credit. Detailed descriptions, objectives and content/methods appear under each subtitle (GLLL-332 or equivalent)
Class 3, Credit 4 (offered annually)

GLLL-445 Great Authors: Mark Twain
Registration #0504-445
Great Authors: Mark Twain—Drama and Film
The course will consist of readings from the bitter-comic writings of the last part of Twain's career, focusing on his philosophy of total determinism, his disenchantment with the "damned human race" and its institutions of government, his trust in and later disillusionment with industrialism, and his romantic nostalgic desire to return to an idyllic pre-Civil War existence. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLL-445 Great Authors: Ibsen—His Times
Registration #0504-445
Drama and Film
Reading and/or viewing ten plays of Henrik Ibsen, the father of modern drama, enables attentive examination of values and structures of modern society that form and formulate the lives of women and men. Ibsen argues that the possibility of individual freedom and creativity can only be won by seeing beyond and acting in spite of formidable forces. The texts and films are analyzed for visual, as well as verbal, information. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLL-445 Great Authors: Chaucer and His Times
Registration #0504-445
Great Authors: Chaucer and The Pearl poet in modern English translation, and a brief introduction to the history of the English language. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLL-445 Great Authors: Jonathan Swift
Registration #0504-445
Great Authors: Jonathan Swift—and the Age of Satire
Vicious satirical writings of Jonathan Swift and other early 18th century authors will be read and analyzed focusing on the intrigue and scandals marking the political and religious environment of the age. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLL-445 Great Authors: Henry James
Registration #0504-445
Great Authors: Henry James
This course will survey the writings of Henry James and examine his use of the "international theme"; his treatment of the relations between men and women; his fictional patterns of initiation, manipulation, and corruption; and his interest in the "psychological novel." We will also examine James's contributions to literary theory and his experiments with literary form. (GLLL-332 or equivalent)
Class 3, Credit 4
GLLI-445 Great Authors: James Joyce
Registration #0504-445
Careful study of three of James Joyce's major works: *Dubliners*, *A Portrait of the Artist as a Young Man*, and *Ulysses*. This course is part of the Literature Concentration and also may be taken as an elective. (GLLI-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLI-445 Great Authors: Shakespeare—Tragedy and Romance
Registration #0504-445
A generous sample of Shakespeare's tragic and romantic plays is investigated to reveal literary excellence and theatrical power. Reference is made to his poems; to the sources of his plays; to the world of Shakespeare's time, its intellectual preconceptions, political stresses, and religious rivalries; and to the theatre and its traditions. This course is part of the Literature Concentration and also may be taken as an elective. (GLLI-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLI-445 Great Authors: Shakespeare—Comedy and History
Registration #0504-445
Several of Shakespeare's comedy and history plays are read and analyzed to reveal their literary excellence and theatrical power. This course is part of the Literature Concentration and also may be taken as an elective. (GLLI-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLI-445 Great Authors: Dostoevsky
Registration #0504-445
A study in the style, themes, and purposes of one of the world's greatest novelists. At least one long novel will be read, along with several shorter works. The writer will be studied in the context of nineteenth-century Russia and for the implications his works and life continue to have for twentieth-century Western culture. This course is part of the Literature Concentration and also may be taken as an elective. (GLLI-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLI-445 Great Authors: Tolstoy
Registration #0504-445
A study in the style, themes, and purposes of one of the world's greatest novelists. At least one long novel will be read, along with several shorter works. The writer will be studied in the context of nineteenth-century Russia and for the implications his works and life continue to have for twentieth-century Western culture. This course is part of the Literature Concentration and also may be taken as an elective. (GLLI-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLI-446 Modern Literature: Fiction
Registration #0504-446
Reading modern plays from Europe, America, and the Third World reveals both style and content that function to depict, from a variety of perspectives, the condition of the individual in the modern world. This course is part of the Literature Concentration and also may be taken as an elective. (GLLI-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLI-446 Modern Literature: Fiction
Registration #0504-446
Reading 20th century short stories and novels from the East, West and Third World reveals, in addition to stylistic innovation and excellence, a variety of perspectives, values, and problems that contribute to the delineation of contemporary global civilization. This course is part of the Literature Concentration and also may be taken as an elective. (GLLI-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLI-445 Modern Literature: Modern Poetry
Registration #0504-445
A close examination of the poems of important English and American poets of the 19th and 20th centuries, including several living poets. This course is part of the Literature Concentration and also may be taken as an elective. (GLLI-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLI-446 Modern Literature: Latin American Literature
Registration #0504-446
Reading short stories, novels, and poetry of modern Mexico, Central and South America reveals a literature and culture wherein the mythic functions as an integral part of the modern world view and the poetic functions as a political power. The impressive vitality of modern Latin American literature can be attributed to its indigenous roots and to its branches that, stemming from a common language and a shared continent, overarch national boundaries and political regimes to form an international literary community. This course is part of the Literature Concentration and the Foreign Language/Culture Concentration and also may be taken as an elective. (GLLI-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLI-446 Modern Literature: World Literature in English
Registration #0504-446
The course will cover short stories and novels written in English by Australian, African, Asian, and West Indian authors. The selections will be discussed against the background of the social, political, and cultural milieu in which the authors worked. This course is part of the Literature Concentration and also may be taken as an elective. (GLLI-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLI-447 Literature Topic
Registration #0504-447
The course provides extended study of special topics in literature (the particular topics will be listed in the subtitles). Students can take any section of this course as part of the Literature Concentration or as an elective. Additional sections also can be taken for concentration or elective credit. Detailed descriptions, objectives, and content/methods appear under each subtitle. (GLLI-332 or equivalent)
Class 3, Credit 4 (offered occasionally)
GLLL-447 Literature Topic: Technology in American Literature
Registration #0504-447
A study of 19th and 20th century American literature (short stories, essays, poems, and novels) commenting on the impact of technology on society. The works selected reflect mostly the skeptical response of American writers to the technological Utopia. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLL-447 Literature Topic: The Nightmare of Technology—Studies in 19th Century British Writings
Registration #0504-447
A study of 19th century British prose and poetry. Attention will be devoted to the effects of industrialism on a changing English society. The course will study, in general, the various social problems confronting 19th century England and how various writers responded to these problems in their works. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLL-447 Literature Topic: The Romantic Vision
Registration #0504-447
A study of 19th century European prose and poetry (primarily British) with particular attention paid to the collapse of the Romantic vision, and its gradual absorption into the Aesthetic and Decadent literary traditions of late 19th century European literature. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLL-447 Literature Topic: Literature of the Bible
Registration #0504-447
A close and rapid reading of selected Old and New Testament books to show the range and variety of literary genres and styles in the Bible. This course is part of the Literature Concentration and Perspectives on Religion Concentration and also may be taken as an elective. (GLLL-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLL-447 Literature Topic: Myth, Legend, Folklore
Registration #0504-447
Scholarly investigation into the rationale, origins and sources of myths, legends, and folklore of the western world and the effect these primary forms have had on our literature. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLL-447 Literature Topic: The Epic
Registration #0504-447
Advanced study of great representative works in the epic mode. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLL-447 Literature Topic: Viking Myth and Saga
Registration #0504-447
Reading the myths, sagas, and folktales of the Viking world reveals the values of a people that created the world's oldest extant democratic society. Both women and men fiercely defend their honor and freedom, willing to risk death rather than to bow in submission. The sagas are analyzed as compelling narrative structures and as documents of a culture that continues significantly to shape Western civilization. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLL-447 Literature Topic: Black Literature
Registration #0504-447
This course traces the literary contributions of selected black writers in the various genres from their roots in the African heritage through slavery to the present day. This course is part of the Literature Concentration and the Minority Relations Concentration. It also may be taken as an elective. (GLLL-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLL-447 Literature Topic: The American Spirit in Literature
Registration #0504-447
This is a survey of the development of American philosophy through the study of selected works from the colonial period through the mid-19th century. Particular attention is given to the ideas of the writers under consideration and their effect on modern American thought. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLL-447 Literature Topic: Multi-Cultural North American Literature
Registration #0504-447
"A teeming nation of nations" is Walt Whitman's description of America. Such diversity has not always been represented in American literature. This course recognizes ethnic, racial, class, and gender differences in the shaping of American literary tradition. In reading, for example, Asian, African, Jewish, Hispanic, and Native-American literature, the emphasis is on the complexity and contradictions of a multi-cultural tradition as well as on a democratic spirit of inclusion rather than exclusion. This course is part of the Literature Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered occasionally)

GLLL-447 Literature Topic: Tolkien and Mythlore
Registration #0504-447
J.R.R. Tolkien's major works will be analyzed to see how fantasy and myth are significant vehicles for dealing with major issues of our contemporary world. Tolkien's mythlore will be studied in terms of how it relates to twentieth century European politics, ethics, and interplay between fate (historical, economic, or mechanistic determinism) and free will, cultural heritage, and religious belief. This course is part of the Literature Concentration and may also be taken as an elective. (GLLL-332)
Class 3, Credit 4 (offered occasionally)
GLLL-480 Women in Literature
Registration #0504-480
This course concentrates on literature by women about women primarily from the early 19th century to the present. The course considers the aspirations, frustrations, and achievements of women as documented by themselves, as well as the perceptions and representations of women in literature by male writers. Works are examined for their literary value as well as their documentation of broader feminist issues. This course is part of the Women's Studies Concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GLLL-481 Literature of War and Peace
Registration #0504-481
This course gives students an awareness of the different views on war and peace in world literature and cinematic works. This course is part of the Peace Studies Concentration, but also may be taken as an elective. (GLLL-332 or equivalent)
Class 3, Credit 4 (offered occasionally)

GLLL-484 Literature and Religion
Registration #0504-484
A literature course which explores the complexity of religious experience, both personal and culture, as it is portrayed by writers from biblical times to our own day. The literature will be supplemented by readings from such disciplines as psychology, philosophy, history and theology. This course is part of the Perspectives on Religion Concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GLLL-501 Speculative Fiction
Registration #0504-501
Speculative fiction is a survey course in contemporary literature presenting conjectural views of man, his world, his society and his belief. Attention is given to the historical development of the genre as well as those works which have become classics of science fiction and fantasy.
Class 3, Credit 4 (offered occasionally)

GLLL-516 Literature and Society
Registration #0504-516
Selected works by writers such as Sophocles, Dante, Dickens, Camus and Vonnegut as important works of art that reflect the human condition and implicitly prophesy against particular evils in attitudes or institutions of their times.
Class 3, Credit 4 (offered occasionally)

GLLL-524 Contemporary Film
Registration #0504-524
A study of contemporary world films, to be drawn from those presently showing in the Rochester area (theaters, television, film festivals). Emphasis will be on both technical and aesthetic aspects of the films.
Class 3, Credit 4 (offered annually)

GLLL-545 The Deaf in Fiction
Registration #0504-545
A study of literature of deafness, with special emphasis on literary works which identify and illuminate "the deaf experience."
Class 3, Credit 4 (offered occasionally)
GSHF-444 American Painting
Registration #0505-444
A survey of the style and meaning in American paintings from the colonial limners to contemporary artists. It will center on what distinguishes painting of the colonies and of the United States from its European counterpart. This course is part of the American Artistic Experience Concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHF-445 Issues in American Art
Registration #0505-445
The purpose of this course is to offer the student a comprehensive overview of American attitudes and philosophies as they have shaped and been embodied in our artistic heritage. Emphasis will be placed on American art from 1850 to the present. This course is part of the American Artistic Experience Concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHF-446 American Film
Registration #0505-446
This course will develop an understanding of theories, styles and trends in American film through a historical and sociological study of the medium. This course is part of the American Artistic Experience Concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHF-447 The American Musical Theatre
Registration #0505-447
This course will survey the development of American opera and the American musical theatre, highlighting representative works, composers, librettists and performers of both the "cultivated and vernacular traditions." This course is part of the American Artistic Experience Concentration and the Music Concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHF-448 20th Century American Music
Registration #0505-448
This course will survey both the cultivated and vernacular traditions of American music in the 20th century, taking into account its political, social and historical frameworks. The course is part of the American Artistic Experience Concentration and the Music Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHF-449 Music Theory I
Registration #0505-449
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. This course is part of the Music Concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHF-450 Music and the Stage
Registration #0505-450
This course will survey the development of opera and the American musical theatre, highlighting representative works, composers, librettists, and performers. This course is part of the Music Concentration and also may be taken as an elective.
Class 3, Credit 4 (offered occasionally)

GSHF-451 Music Performance
Registration #0505-451
This course involves the historical and theoretical study of musical forms and styles in the context of active participation in the RIT Singers or the RIT Philharmonia. As an experiential outcome of such study, the group will prepare significant musical compositions for public performance. Credit: one hour per quarter. A total of four such credits may count as a Liberal Arts elective. This course is part of the Music Concentration and also may be taken as an elective.
Class 1, Credit 1 (offered quarterly)

GSHF-480 Women and the Visual Arts
Registration #0505-480
This course examines the image of women in the visual arts and the role of women as image makers. Major topics to be covered include: the variety of images of women, the evolution and change of these images over time, media images (as differentiated from fine art images) of women, images of women by women and men, women's images and the issues of their relationship to the images made by men, the nude and pornography, history of women artists, selected women artists and their work, relation of their work to the art of the period, current issues and status of women artists. This course is part of the Women's Studies Concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHF-481 Oriental Art
Registration #0505-481
A survey outlining the development of art in India, China, Japan and examining the philosophical circumstances that distinguish Eastern artistic traditions. There will be opportunity for each student to pursue special interests in depth. This course is part of the Foreign Language/Culture Concentration and also may be taken as an elective.
Class 3, Credit 4 (offered occasionally)

GSHF-482 Beethoven
Registration #0505-482
This course introduces the music of Beethoven in the psychological, political and philosophical contexts that gave it shape and force. Using the classical style of Haydn and Mozart as background, it focuses on the development of the "Dionysian" personality in Beethoven's compositions and the creation of the sublime in music. This course is part of the Foreign Language/Culture Concentration and the Music Concentration and also may be taken as an elective.
Class 3, Credit 4 (offered occasionally)

GSHF-483 Bach and the Baroque
Registration #0505-483
This course is devoted to a study of Johann Sebastian Bach, his life and times, and his music in the context of Baroque styles and aesthetics. Compositions from each of the major periods of his creative life will be examined and discussed, particularly as they serve the social and religious purposes for which they were written, and as they reveal the psychology of so-called "Rhineland mysticism." This course is part of the Foreign Language/Culture Concentration and the Music Concentration and also may be taken as an elective.
Class 3, Credit 4 (offered occasionally)
**GSHF-484 Romanticism in Music**  
Registration #0505-484  
This course surveys the rise of German Romanticism from Beethoven to Strauss in the context of the development of 19th century musical styles in general. The course is part of the German Language Culture Concentration and the Music Concentration and may also be taken as an elective.  
Class 3, Credit 4 (offered occasionally)

**GSHF-501 Craftsmanship in Gothic Art**  
Registration #0505-501  
A survey of religious and secular art in Europe from about 1100 to 1500 A.D. and its antecedents. Media to be studied include manuscript illumination, sumptuous objects, and church architecture (including associated sculpture, mosaics, paintings and stained glass).  
Class 3, Credit 4 (offered occasionally)

**GSHF-509 Impressionism to Analytical Cubism**  
Registration #0505-509  
This course deals with the historical and stylistic aspects of the avant-garde painters of the second half of the 19th century and the first decade of the 20th century. It traces the struggles of these artists to break away from the traditional forms of expression and to attain a new vision of reality.  
Class 3, Credit 4 (offered occasionally)

**GSHF-512 Master Drawings Since the Renaissance**  
Registration #0505-512  
A study of drawings from the 15th to the 20th centuries, including the work by Leonardo da Vinci, Michelangelo, Durer, Rembrandt and Picasso.  
Class 3, Credit 4 (offered occasionally)

**GSHF-514 Cubism to the Present**  
Registration #0505-514  
An investigation into modern man's struggle to preserve his identity in our fast developing technological world as reflected in the vitality and diversity of today's visual arts. Differences and similarities with art forms of earlier eras and other cultures also will be discussed.  
Class 3, Credit 4 (offered occasionally)

**GSHF-519 Rembrandt Van Rijn: His Art and Times**  
Registration #0505-519  
A study of the life, art and times of the Baroque master. Emphasis will be placed on his stylistic evolution, his relation to his society and to the Baroque style, and on his humanistic world view.  
Class 3, Credit 4 (offered occasionally)

**GSHF-520 Picasso**  
Registration #0505-520  
The life and work of one of the most influential artists of our century.  
Class 3, Credit 4 (offered occasionally)

**GSHF-530 Art and Human Values**  
Registration #0505-530  
This course investigates the nature and value of the arts and their relation to other areas of human activity such as religion, economics, science and technology and personal freedom.  
Class 3, Credit 4 (offered occasionally)

**GSHF-532 African Tribal Art**  
Registration #0505-532  
After an investigation of the world of "primitive" man and the function of art in a tribal environment, this course will focus on preliterate societies of sub-Saharan Africa.  
Class 3, Credit 4 (offered occasionally)

**GSHF-534 Renaissance and Baroque Art**  
Registration #0505-534  
This course examines the stylistic development of painting in Europe from 1420 to 1650. The Renaissance style will be analyzed and studied through the works of painters, with emphasis placed on stylistic evolution through the 15th century and the classical synthesis created in the high Renaissance. Mannerist and Early Baroque paintings will be discussed from the point of view of the Renaissance style to investigate concepts of stylistic continuity, evolution, and change. Paintings also will be discussed within their culture and political contexts.  
Class 3, Credit 4 (offered occasionally)

**GSHG-483 The Biblical Tradition**  
Registration #0506-483  
An examination of Judaism and Christianity as they are presented in the Old and New Testaments. This course is part of the Perspectives on Religion Concentration and may also be taken as an elective.  
Class 3, Credit 4 (offered annually)

**GSHG-484 Introduction to the New Testament**  
Registration #0506-484  
This course is designed to provide the student with a basic understanding of Christianity as it is presented in the New Testament. Christian thought is examined against the background of the economic, social, political, and historical setting of the New Testament period. A modern critical biblical scholarship, as well as the traditional approaches to the New Testament, will be applied. This course is part of the Perspectives on Religion Concentration and may also be taken as an elective.  
Class 3, Credit 4 (offered annually)

**History**

**GSHH-301 History: Modern America**  
Registration #0507-301  
This course examines the political, social, cultural, and economic development of the American people in the modern period. Studies the United States in its foreign relations.  
Class 3, Credit 4 (offered quarterly)

**GSHH-302 History: Modern European**  
Registration #0507-302  
An examination of social, economic, political and intellectual movements of Europe from the Modern Period to the Twentieth Century, which played major roles in shaping our contemporary world.  
Class 3, Credit 4 (offered quarterly)
**GSHH-440 United States Social and Intellectual History**
Registration #0507-440
This course will examine the American people, their society and their culture, in relation to the nation's institutions: government, courts, business, labor and political and private associations. The interplay between the American people and the institutions which structure their lives sheds light on the dynamic forces which shape American history and help to explain the present. Instead of detailing day-to-day chronology, this study will highlight the sweep of major trends and movements over longer periods of the American experience. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)
Class 3, Credit 4 (offered annually)

**GSHH-441 20th Century American Diplomatic History**
Registration #0507-441
An examination of the major events and forces which shaped American diplomacy from the opening years of the 20th century to the immediate post World War II era. This course is part of the History concentration and also the Global Studies Concentration, and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)
Class 3, Credit 4 (offered annually)

**GSHH-442 The Contemporary Middle East**
Registration #0507-442
This course analyzes the making of the contemporary Middle East from the rise of Islam to the present with special emphasis on the patterns of political development in the 20th century. This course is part of the History Concentration, the International Relations Concentration, and the Foreign Language Culture Concentration. It also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent for the History Concentration; GSSM-211 or GSSM-215 or equivalent for the International Relations Concentration)
Class 3, Credit 4 (offered annually)

**GSHH-443 European Social Intellectual History Since 1600**
Registration #0507-443
An analysis of social events and intellectual movements in Europe since 1600. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)
Class 3, Credit 4 (offered annually)

**GSHH-444 Strategy and Diplomacy: Europe, 1871-1945**
Registration #0507-444
This course investigates the origins and outcomes of the two World Wars with special emphasis on the conflicting strategies and secretive diplomacy adopted by the European Great Powers between 1871 and 1945. This course is part of the History Concentration and the International Relations Concentration and also may be taken as an elective.
Class 3, Credit 4 (offered occasionally)

**GSHH-445 Modern Latin America**
Registration #0507-445
This course surveys the historical development of the Hispanic and Portuguese areas of the Americas from independence to the mid-twentieth century. The movement towards independence, the problems that emerged during the nineteenth century of forming unified nations, and the problems of modernization in the twentieth century are all covered. The histories of selected countries are used to illustrate these issues. This course is part of the History Concentration and also the Foreign Language/Culture Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)
Class 3, Credit 4 (offered annually)

**GSHH-446 Europe Since 1945**
Registration #0507-446
An analysis of the political, economic, social and cultural events that have shaped the new system of Europe since 1945. This course is part of the History Concentration and the Global Studies Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)
Class 3, Credit 4 (offered annually)

**GSHH-447 The United States Since 1945**
Registration #0507-447
An analysis of the major themes characterizing post-World War II United States history. The course aims to investigate the specific characteristics of America as a modern state. Selected themes will have an intellectual, cultural and political history focus. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)
Class 3, Credit 4 (offered occasionally)

**GSHH-448 The History of Russia to 1917**
Registration #0507-448
A study of the historical context and development of Russian society and the factors leading to the emergence of the Soviet regime. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)
Class 3, Credit 4 (offered occasionally)

**GSHH-449 The History of Russia Since 1917**
Registration #0507-449
A study in depth of the Bolshevik revolution, the rise of Stalin, industrialization and collectivization, the terror and the purges, the process of de-Stalinization under Krushchev and his successors, and current developments in the Soviet Union. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)
Class 3, Credit 4 (offered occasionally)

**GSHH-450 Europe of the Dictators: Stalin, Mussolini, Hitler**
Registration #0507-450
A study of the European states and peoples in the inter-war period, the diplomatic and military history of World War II, the reconstruction of Europe, the Cold War, detente, and contemporary Europe. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)
Class 3, Credit 4 (offered occasionally)
GSHH-451 United States Community History
Registration #0507-451

Students will study the lives of Americans in various communities (such as families, working, ethnic and political communities) from 1850 to the present. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or 302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-452 Race and Society
Registration #0507-452

A social, historical, political, religious and anthropological appraisal of the factors which have produced the differences between social appearances and social attainments of the world's population. Primary emphasis will be placed upon the fact that such differences are not sufficient reason for believing that there are underlying disparities or innate capacities among races. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or 302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-453 United States-Latin America Diplomatic Relations
Registration #0507-453

The emphasis in this course will be on analyzing the United States' relations with Latin America from independence to the present. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or 302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-454 Crime, Violence, and Urban Crisis
Registration #0507-454

This course will analyze the causes of the outbreak and rapid increase of violent and criminal trends in the world as the most serious realities of the 20th century. The course will be a comparative study on America's and the world's problems of violence, crime, and urban crisis. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or 302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-455 The Italian American Experience
Registration #0507-455

Examines the history and culture of the Italian Americans from the colonial period to the present. Stresses their role in the arts, business, politics, the Church, and the labor movement. Italian history is studied as it relates to the Italians in America. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or 302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-456 The United States and The Third World Revolutions in the 20th Century
Registration #0507-456

One of the dominant features of the 20th century has been the revolution of rising expectations in the countries of the Third World. This course will study the underlying causes of these revolutions and the reaction of the United States government to this revolutionary ferment in Latin America, Asia and Africa. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or 302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-457 The History of Popular Culture in America
Registration #0507-457

American myths, icons, heroes, and institutions as represented in American popular culture from the late nineteenth century to the present. Examine the history of popular entertainment and the mass media in the United States. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or 302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-458 Civil Liberties in American History
Registration #0507-458

The course will teach the history of civil liberties in America. Emphasis will be placed on the current state of civil liberties. Students will make philosophical as well as historical analyses of cases. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or 302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-459 Social Justice and the Constitution in American History
Registration #0507-459

This course will analyze how well the Constitution has met the social and political expectations of citizens. Emphasis will be on analyzing Supreme Court cases that explain the current state of social justice. This is a companion course to GSHH-532, Civil Liberties in American History. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or 302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-460 Revolutionary Leaders in Latin America
Registration #0507-460

In this course three movements will be studied: the rise of Juan Peron in Argentina in the 1940s, Fidel Castro's revolution in Cuba; and Salvador Allende's electoral victory in Chile in 1970. By studying these three "revolutionary" movements, it is hoped that the student will come to an understanding of the historical perspective and nature of social discontent in Latin America.

Class 3, Credit 4 (offered annually)

GSHH-461 The Renaissance World
Registration #0507-461

The thematic study of the Renaissance in Europe from 1300 to 1600. The course explores the art, literature, philosophy, society and institutions of the Renaissance that have contributed to the revival of the western culture and heritage. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or 302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-480 History of American Women
Registration #0507-480

A history of women in North America from the colonial period to the present. Concentrates on the social, political, cultural, diplomatic and economic history of women in the United States and Canada. This course is part of the Women's Studies concentration and the History Concentration and also may be taken as an elective. (GSHH-301 or 302 or equivalent)

Class 3, Credit 4 (offered occasionally)
GSHH-483 Christianity in the West
Registration #0507-483
This course traces the development of Christian thought in the broad historical context of Western Civilization. It concentrates on major movements and outstanding personalities. This history of Christian thought is examined against the background of economic, political, social and intellectual currents. The study sheds light on both the conflicts within and the criticisms from outside and Christian tradition. This course is part of the Perspectives on Religion Concentration and the History Concentration and also may be taken as an elective. (GSHH-301 or 302 or equivalent)
Class 3, Credit 4 (offered annually)

GSHH-485 Foundations of Asian Civilizations
Registration #0507-485
This course is primarily a study of the Confucian/Buddhist world in East Asia with the focus on China and Japan, their origins and cultural characteristics. This course is part of the Foreign Language/Culture Concentration and the History Concentration and also may be taken as an elective. (GSHH-301 or 302 or equivalent)
Class 3, Credit 4 (offered occasionally)

GSHH-486 China and Japan in the 20th Century
Registration #0507-486
An examination of social, political, economic and intellectual developments of China and Japan in the 20th century with an analysis of how these two Asian powers have reached their respective significant status in the contemporary world. This course is part of the Foreign Language/Culture Concentration and the History Concentration and also may be taken as an elective. (GSHH-301 or 302 or equivalent)
Class 3, Credit 4 (offered annually)

GSHH-487 History of Chinese Communism
Registration #0507-487
An analysis of the main characteristics of Chinese Communism, its native roots, Marxist/Leninist elements, and Maoist innovations. The course also will examine the causes for the rise of Communism in modern China, the context and process of its development, as well as contributions and problems Communism brought to the Chinese people. In addition, China and the world will be examined. This course is part of the Foreign Language/Culture Concentration and the History Concentration and also may be taken as an elective. (GSHH-301 or 302 or equivalent)
Class 3, Credit 4 (offered annually)

GSHH-488 Modern Germany
Registration #0507-488
A study of Germany in the 19th and 20th centuries. This course will begin with the unification of Germany in 1871 and trace the political evolution of the nation to the present. Special emphasis will be placed on the rise of Nazism. Pertinent social and cultural factors will be considered as well. This course is part of the History Concentration, the International Relations Concentration, and the Foreign Language/Culture Concentration. It also may be taken as an elective. (GSHH-301 or 302 or equivalent)
Class 3, Credit 4 (offered quarterly)

GSHH-489 Japan in the Modern World
Registration #0507-489
An examination of social, economic, political and intellectual developments of Japan in the nineteenth and twentieth centuries with an analysis of how Japan has reached such a significant status in the contemporary world. This course is part of the Foreign Language/Culture Concentration and the History Concentration and also may be taken as an elective. (GSHH-301 or 302 or equivalent)
Class 3, Credit 4 (offered occasionally)

GSHH-490 History of Mexico
Registration #0507-490
The historical development of Mexico, including the colonial period, independence movement, the liberal-conservative class, and the revolution of 1910. This course is part of the Foreign Language/Culture Concentration and the History Concentration and also may be taken as an elective. (GSHH-301 or 302 or equivalent)
Class 3, Credit 4 (offered alternate years)

GSHH-491 Black Experience in America
Registration #0507-491
Examines the history of blacks in America, treating the subject primarily from a social and cultural perspective. Studies the impact of whites on black Americans and describes the contribution of blacks to the development of the United States. This course is part of the Minority Relations Concentration and the History Concentration and also may be used as an elective. (GSHH-301 or 302 or equivalent)
Class 3, Credit 4 (offered annually)

GSHH-492 Selected Problems in Black History
Registration #0507-492
A seminar approach to the thought of key black leaders (Washington, Garvey, King) and the study of civil rights and black power movements. This course is part of the Minority Relations Concentration and the History Concentration and also may be taken as an elective. (GSHH-301 or 302 or equivalent)
Class 3, Credit 4 (offered occasionally)

GSHH-493 History of Social Discrimination
Registration #0507-493
A study of the discriminatory practices, present and historical, found in the United States. To include the cultural values and problems of acculturation for the American Indian, Black, Puerto Rican, Chicano, Asian, women, and religious groups, with emphasis on its implication to social work. This course is part of the Minority Relations Concentration and the History Concentration and also may be taken as an elective. (GSHH-301 or 302 or equivalent)
Class 3, Credit 4 (offered annually)
GSHH-494  The Immigrant in American History
Registration #0507-494
This course explores the personal and collective experience of immigrants arriving in North America from colonial times to the present. Categories of special interest include immigrant expectations and adaptation; the tension between ethnic exclusiveness and assimilation; the role of the immigrant in the urban communities of the United States and Canada; native-born reactions to immigrants; the ethnic revival of the 1960s and 1970s; and the condition of ethnicity and the new immigration in contemporary America. This course is part of the Minority Relations Concentration and the History Concentration and may also be taken as an elective. (GSHH-301 or 302 or equivalent)

Class 3, Credit 4 (offered annually)

GSHH-495  Black Civil Rights
Registration #0507-495 in the 20th Century
This course examines the social and legal history of civil rights in the U.S. with particular attention to the demonstrations of the 1950s and 1960s and the philosophy of the Rev. Dr. Martin Luther King, Jr. Finally, it will compare his views with those of the recent Black Power Movement. This course is part of the Minority Studies Concentration and the History Concentration and may also be taken as an elective. (GSHH-301 or 302 or equivalent)

Class 3, Credit 4 (offered annually)

GSHH-496  Survey of African History
Registration #0507-496
This course is designed to provide an overview of African history and politics in three phases: pre-colonial times, colonialism, and the post-colonial era. It is part of the History Concentration, Global Studies Concentration, and Minority Relations Concentration. (GSHH-301 or 302 or equivalent)

Class 3, Credit 4 (offered annually)

GSHH-507  World at War 1914-45
Registration #0507-507
This course aims to give continuity (interpretation of cause and effect relationships) to the major developments of the period 1914-45. The course notes the impact of classical liberal economic theories in a period of rapid mechanization and industrialization. Rising social expectations in the period of exploding democratic and later social liberalism are observed in their relationship to revolution and reaction. This course considers the causes of World War I and examines the military operations in some detail.

Class 3, Credit 4 (offered occasionally)

GSHH-530  19th Century American Diplomatic History
Registration #0507-530
An examination of American diplomacy from the early years of American independence to the emergence of the United States as a world power. The War of 1812, Monroe Doctrine, and Manifest Destiny are among the topics considered.

Class 3, Credit 4 (offered annually)

GSHH-550  The Ascent of Man
Registration #0507-550
The course is a multi-disciplinary study in societal, historical, intellectual, technological and scientific perspectives of man's development from prehistoric times to the present. The course is partially based on the television series, "The Ascent of Man," created and narrated by J. Bronowski.

Class 3, Credit 4 (offered occasionally)

GSHH-552  War and Crises, 1945-Present
Registration #0507-552
World backdrop for American foreign policy and relations from 1945 to the present, dealing with the Greek Civil War, the Chinese Civil War, the Korean War, the American assumption of Western leadership in the Cold War, economic warfare, the Cuban crisis, war in Southeast Asia, the roles of Presidents Truman to Reagan, detente, multinational business, the press, and crises in the Middle East. Background is developed for decisions of the 1980s.

Class 3, Credit 4 (offered occasionally)

GSHH-557  Communism, Fascism and Democracy in Their Theoretical Foundations
Registration #0507-557
A political and historical appraisal of these philosophies. Emphasis is placed upon the claims they make with regard to the individual and the state and the changes they demand for the future.

Class 3, Credit 4 (offered occasionally)

Science, Technology, and Society

GSHN-211  Science, Technology and Values
Registration #0508-211
This course explores the concepts and effects of science and technology in 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 been affected by our values. 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.

Class 3, Credit 4 (offered annually)

GSHN-440  History of Science
Registration #0508-440
This course presents a study of the origins, nature, and development of Western science, and its social, economic, and cultural context. This course is part of the Social Impacts of Science and Technology Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-441  Science and Technology Policy
Registration #0508-441
This course will examine 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. This course is part of the Social Impacts of Science and Technology Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-442  History of American Technology
Registration #0508-442
This course presents an examination of the cultural context of American technology and its influence on American social, economic, political, and cultural institutions. This course is part of the Social Impacts of Science and Technology Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)
GSHN-443  
**Face of the Land**  
Registration #0508-443  
This course is a case study in the relationship of technology and society, focusing on the interaction of land, people and technology. By considering the natural landforms of the United States and other countries as appropriate, students will see how the nature of land determines its value. As technological innovations are made and introduced, old relationships with the land are altered, sometimes irreversibly. Through this study students have a concrete example of the positive and negative effects of technology on the social structure. This course is part of the Social Impacts of Science and Technology Concentration and also may be taken as an elective.  
Class 3, Credit 4 (offered occasionally)

GSHN-444  
**Social Consequences of Technology**  
Registration #0508-444  
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 will study several interactions between technology and the world in which we live. We will investigate how various technologies developed and compare the expected effects of the new technologies with the actual results. This course is part of the Social Impacts of Science and Technology Concentration and also may be taken as an elective.  
Class 3, Credit 4 (offered annually)

GSHN-445  
**Biomedical Issues in Science and Society**  
Registration #0508-445  
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. This course is part of the Social Impacts of Science and Technology Concentration and also may be taken as an elective.  
Class 3, Credit 4 (offered annually)

GSHN-446  
**Makers of Modern Science**  
Registration #0508-446  
This course is designed to help the student understand the life of modern science through the lives of modern scientists. Modern science is understood to be science from the Scientific Revolution of the 16th and 17th centuries to the present. Much recent scholarship has been devoted to analyzing science in context; i.e., the way it actually develops in particular social and political environments as well as through the lives of individuals. This course is part of the Social Impacts of Science and Technology Concentration and also may be taken as an elective.  
Class 3, Credit 4 (offered annually)

GSHN-447  
**Special Topics in the Social Impacts of Science and Technology**  
Registration #0508-447  
This course will be offered periodically in the Social Impacts of Science and Technology Concentration. Topic and specific content and methods will vary from year to year or term to term. The course will allow examination of a special problem or area relevant to the other courses in this area of study. It also may be taken as an elective.  
Class 3, Credit 4 (offered occasionally)

GSHN-481  
**Introduction to Environmental Studies**  
Registration #0508-481  
This course seeks to make students aware of the environmental consequences of modern technology by investigating to what degree various technological systems conflict with the basic ecological principles. This course is part of the Environmental Studies Concentration and also may be taken as an elective.  
Class 3, Credit 4 (offered annually)

GSHN-482  
**Energy and the Environment**  
Registration #0508-482  
In this course we will look at the current situation, its environmental implications, and try to determine how we got here, why we got here, and where we may be able to go in the next 20 to 50 years. We will look at the nature, uses, and relative importance of our sources of energy; high technology and low or appropriate technology; hard energy paths and soft energy paths. We will look especially at the role of government policy in the energy area. This course is part of the Environmental Studies Concentration and also may be taken as an elective.  
Class 3, Credit 4 (offered annually)

GSHN-483  
**Environmental Values**  
Registration #0508-483  
We seek to identify, interpret, and trace the values associated with concern for the environment, and the factors that induced change in these values. Concern with the environment is not a new concept; its history reaches to ancient times, but the values related to this concern have drastically changed. Understanding environmental values helps one become a better prepared participant in the environmental decision making. This course is part of the Environmental Studies Concentration and also may be taken as an elective.  
Class 3, Credit 4 (offered annually)

GSHN-484  
**Environmental Policy**  
Registration #0508-484  
Public compliance with environmental regulations has become increasingly complicated as a result of many laws and regulations instituted since the mid 1960s. The purpose of this course is to study the consequences of major environmental legislation and regulations and to examine the actions of both citizens and the corporate sector as they comply with these laws. The course also will focus on the economic and social implications and value of environmental regulation and enforcement and will identify current developments in the area. This is a concentration course in the Environmental Studies Concentration and also may be taken as an elective.  
Class 3, Credit 4 (offered annually)

GSHN-485  
**Development of U.S. Energy Policy**  
Registration #0508-485  
An examination of the development of U.S. energy policy from the mid-19th century to the present. A number of policies have affected the supply of and demand for energy for many years, and an examination of the development of these policies will aid in understanding some of the current energy conflicts and debates. This course is part of the Environmental Studies Concentration and may also be taken as an elective.  
Class 3, Credit 4 (offered occasionally)
GSHN-486  Modern Warfare Technology
Registration #0508-486
and Arms Control Problems
In this course we will study the importance of science and technology to defense matters. We investigate how modern weapons, both nuclear and conventional, their delivery systems, and reconnaissance and surveillance methods have seriously affected the character of armed conflict and of preventing wars. However, we shall also see how scientists, by providing their expertise, have been able to influence national security and attempts to control arms. This course is part of the Peace Studies Concentration and the Social Impacts of Science and Technology Concentration. It also may be used as an elective.
Class 3, Credit 4 (offered occasionally)

GSHN-487  Special Topics
Registration #0508-487
in Environmental Studies
This course will be offered periodically in the Environmental Studies Concentration. Topic and specific content and methods will vary from year to year or term to term. The course will allow examination of a special problem or area relevant to the other courses in this area of study. It also may be taken as an elective.
Class 3, Credit 4 (offered occasionally)

GSHN-503  Technology and the Individual
Registration #0508-503
A study of the effects on the life of the individual due to the acceleration of technological change.
Class 3, Credit 4 (offered occasionally)

GSHN-506  Space, Time and Reality
Registration #0508-506
In this course we learn the conceptual development of the 20th century theories of time and space with major emphasis on their applications in the present decade. These views, which grew out of the rigorous mathematical logic of relativity theory and quantum theory, represent one of the most profound revisions of intellectual thought in human history. We learn how any vestige of an absolute frame of reference in space and time, and how cause and effect and strict determinism were demolished and how probability was introduced by means of these theories.
Class 3, Credit 4 (offered occasionally)

GSHN-507  Community Energy Planning
Registration #0508-507
This course is designed to allow the student to understand the concepts underlying community energy self-reliance, how to analyze a community's energy supply and consumption, and how to evaluate possible energy futures for a community based as much as possible on conservation and alternative energy strategies.
Class 3, Credit 4 (offered occasionally)

GSHN-512  Science as a Humanity
Registration #0508-512
A telecourse designed to present the way of the humanist and reveal it as commanding more of the hidden potential of the individual, and to present science as an expression of the human spirit that commands more of the hidden potential of nature. Science is presented as one lifestyle—a human one based on the need for understanding, and not for the sake of progress, survival, or upgrading one's position in the world.
Class varies, Credit 4 (offered on sufficient demand)

GSHN-514  History of American Medicine
Registration #0508-514
A survey of the development of medical thought and practice in America from the 17th century to the present.
Class 3, Credit 4 (offered occasionally)

GSHN-515  Community Environmental Issues
Registration #0508-515
This course will explore three general areas of community environmental concern: land use, solid waste, and energy. These issues focus attention on potential conflict over technology and societal values. While the emphasis in this course will be on events and issues relating primarily to Monroe County, the topics are prevalent in any community in the United States today. The intent of the course is to allow the student to learn how to evaluate different options for dealing with land use, solid waste, and energy in a community context; and to be able to see that these decisions, involving technology and society, can and should be made by all affected parties.
Class 3, Credit 4

Philosophy

GSHP-210  Philosophy: Selected Issues
Registration #0509-210
An introduction to some of the major problems, methods and insights of philosophy with readings from both classical and contemporary sources.
Class 3, Credit 4 (offered quarterly)

GSHP-211  Philosophy: Ethics
Registration #0509-211
An introduction to moral philosophy through an analysis, comparison and evaluation of some main theories that have been offered as systematic ways of making moral decisions, and through discussions of contemporary moral problems.
Class 3, Credit 4 (offered quarterly)

GSHP-213  Philosophy: Critical Thinking
Registration #0509-213
An introduction to philosophical analysis, especially as it may be applied in contexts other than professional philosophy.
Class 3, Credit 4 (offered quarterly)

GSHP-440  Philosophy of Religion
Registration #0509-440
A critical examination of a number of important issues connected with religion. These include the nature of religion itself, the existence of God, the problem of evil, and questions about the language we use when we talk and write about religion. This course is part of the Philosophy Concentration and the Perspectives on Religion Concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHP-441  Logic
Registration #0509-441
An introduction to the basic principles of logic. The main emphasis will be on symbolic, or formal logic, but some attention may be paid to informal logic as well. This course is part of the Philosophy Concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)
This course will introduce students to thinking philosophically about the nature of art and its relation to other human experiences. Among the topics considered will be: the aesthetic experience, the relation between morality and art, ugliness in art, and truth in art. This course is part of the Philosophy Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHP-447 Aesthetics
Registration #0509-447
This course will present moral issues which arise in the professions and other areas of technical expertise. These problems in applied ethics will be studied through contemporary literature by moral philosophers (Donegan, Frankena, Gadamer, Habermas, Jonas, Singer, and Wellmer), as well as key classical texts (Plato, Locke, Reid, Kant, and Dewey).
Each section of the course will apply moral theory to one of a number of professional areas, such as business, communications, medicine and bioethics, public policy, and technology. This course is part of the Philosophy Concentration and also may be taken as an elective. (GSHP-211)
Class 3, Credit 4 (offered annually)

GSHP-448 Philosophy of Peace
Registration #0509-448
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. This course is part of the Peace Studies Concentration and Philosophy Concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHP-449 Special Topics in Philosophy
Registration #0509-449
This course will be a critical examination of issues in some area of philosophy not covered in any other concentration course. Examples of likely topics are metaphysics, epistemology, the philosophy of mind, and the philosophy of language. This course is part of the Philosophy Concentration and also may be taken as an elective.
Class 3, Credit 4 (offered occasionally)

GSHP-450 Undergraduate Seminar in Philosophy
Registration #0509-450
This course will examine some area of philosophy at an advanced undergraduate level. The area examined will probably vary from quarter to quarter. The seminar is designed especially for those whose interest in philosophy goes beyond the requirements of the Liberal Arts curriculum. This course is part of the Philosophy Concentration and also may be taken as an elective. (Two courses in philosophy, or permission of the instructor)
Class 3, Credit 4 (offered occasionally)

Behavioral Science

Anthropology

GBSA-210 Cultural Anthropology
Registration #0510-210
This course is a study of the nature, method, and scope of human culture—the patterns of thought and behavior with which mankind makes decisions, criticisms, choices and judgments in order to satisfy the needs of life and experience.
Class 3, Credit 4 (offered quarterly)
Class 3, Credit 4 (offered occasionally)

GBSA-440 Culture in Crisis
Registration #0510-440
The Chinese proverb "may you be cursed to live in interesting times" sets the tone for this course. Change in all subsystems of human culture is the hallmark of the 20th century. The stress and strain that accompany change challenge every traditional way of life in the world today. From peasant revolutions and millenarian movements, to the feminist activism of the past generation, causes and consequences are explored in historical and cross-cultural perspective. This course is part of the Social Change in a Technological Society Concentration and also may be taken as an elective. (GBSA-210 or GBSS-210)
Class 3, Credit 4 (offered occasionally)

GBSA-441 American Culture: The Anthropology of Us
Registration #0510-441
Call them Nacirema, American backward. This course takes an anthropologist's eye view of the "Nacirema" way of life now, what they say and think about themselves, and how they actually act, their myth, ritual, music, humor, religion, class structure, regional subcultures, and ethnic groups. This course is part of the Social Change in a Technological Society Concentration and also may be taken as an elective. (GBSA-210 or permission of instructor)
Class 3, Credit 4 (offered annually)

GBSA-483 The Anthropology of Religion
Registration #0510-483
This course is designed to provide students with a basic understanding of how religion operates as an integral part of any society. In order to demonstrate this, the institution of religion will be studied from a cross-cultural, anthropological perspective. Emphasis will be on primitive and peasant societies. This course is part of the Perspectives on Religion Concentration and also may be taken as an elective.
Class 3, Credit 4 (offered occasionally)

GBSA-501 Anthropological Research Methods: Explorations in Subcultural Diversity
Registration #0510-501
This course is designed to expose students from a variety of backgrounds to an alternative means of understanding human behavior through the methods of the cultural anthropologist and to demonstrate that variations in cultural patterning exist in our presumably homogeneous society. The primary emphasis in the course will be involvement of students in the actual observation of human behavior and collection of data in a subculture of their own selection in the Rochester area.
Class 3, Credit 4 (offered occasionally)

GBSA-502 American Culture: The Archaeology of Us
Registration #0510-502
American history and contemporary American society are examined through the only unexpurgated record of our behavior, the material remains. This course illustrates how the techniques of archaeology can throw new light on the lives of our Pilgrim forebears, the founding fathers, on slaves and free blacks, on the American industrial revolution, and even on the contemporary middle-class of a city like Tucson, Arizona.
Class 3, Credit 4 (offered occasionally)

GBSA-505 Cultural Diversity
Registration #0510-505
Diversity of cultures is a pervasive fact of life in America in the second half of the twentieth century. The dynamics of intergroup relations will have a profound impact on American economic, social, political, and cultural life in the twenty-first century. The course approaches diversity as an asset; an individual's appreciation for this diversity depends upon replacing a monocultural with an intercultural perspective. We are striving to reach a point where we not only celebrate diversity, but take it for granted at the same time. Consequently, the content emphasizes directed observations as an approach to developing more relativistic attitudes. Diverse techniques from simulation to field experience will be used in order to assist students in understanding and adjusting to diversity.
Class 3, Credit 4 (offered annually)

Psychology

GBSP-210 Introduction to Psychology
Registration #0514-210
This course is designed to introduce the student to the scope and methodology of psychology. Topics will include: aims and methods, sensation and perception, learning and memory, emotion and motivation, normal and abnormal personality, and social psychology.
Class 3, Credit 4 (offered quarterly)

GBSP-440 Childhood and Adolescence
Registration #0514-440
This course explores human development from conception through adolescence. The developmental approach provides the opportunity to integrate many areas of psychological research such as cognition, personality, perception, social interaction and moral development as they apply to human development. This course is part of the Psychology Concentration and also may be taken as an elective. (GBSP-210 or equivalent)
Class 3, Credit 4 (offered annually)

GBSP-441 Growth Psychology
Registration #0514-441
This course examines the major assumptions, theories and implications of "growth" or humanistic psychology. In the course, students will study human beings as dynamic, complex creatures who shape themselves and their world through the choices they make each day and whose best hope for realizing their individual and collective potential is an accurate understanding of what human persons need to grow psychologically and what societal conditions seem to foster such growth. This course is part of the Psychology Concentration and also may be taken as an elective. (GBSP-210 or equivalent)
Class 3, Credit 4 (offered annually)

GBSP-442 Adulthood and Aging
Registration #0514-442
This course encompasses the psychology of the span of life from young adulthood through the middle years. The developmental approach, presented in an interdisciplinary framework, provides a systematic orientation to the study of the individual during early adulthood. This course is part of the Psychology Concentration and also may be taken as an elective. (GBSP-210 or equivalent)
Class 3, Credit 4 (offered annually)
GBSP-443 Learning and Memory
Registration #0514-443
This course focuses on the environmental forces that are responsible for the outcome of human development. It studies how learning shapes and changes individuals almost from the moment they are born and how it continues to be all pervasive throughout their lives. It examines the complexity of memory process, which is an essential element of learning and learning theories and their applications in real-life situations. This course is part of the Psychology Concentration and also may be taken as an elective. (GBSP-210 or equivalent)
Class 3, Credit 4 (offered annually)

GBSP-444 Social Psychology
Registration #0514-444
This course will attempt to give a general overview of those areas of social psychology currently under the most intensive investigation, and likely to be of most interest to the student, including nonverbal communication, attraction, aggression and group effects. This course is part of the Psychology Concentration and also may be taken as an elective. (GBSP-210 or equivalent)
Class 3, Credit 4 (offered annually)

GBSP-445 Psychology of Perception
Registration #0514-445
This course covers topics of all sense modalities with emphasis on visual perception. It traces what happens to the physical stimulus as our sensory systems analyze it to produce complicated perceptions of the world around us. Many complex perceptual phenomena draw upon explanations at the physiological, psychological and cognitive levels. This course is part of the Psychology Concentration and also may be taken as an elective. (GBSP-210 or equivalent)
Class 3, Credit 4 (offered annually)

GBSP-446 Psychology of Personality
Registration #0514-446
This course examines the strengths and weaknesses of the major psychological theories of personality. Methods of assessing personality, research, and applications of theory to real-life situations are included in the evaluation of each theory. This course is part of the Psychology Concentration and also may be taken as an elective. (GBSP-210 or equivalent)
Class 3, Credit 4 (offered annually)

GBSP-447 Abnormal Psychology
Registration #0514-447
This 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. This course is part of the Psychology Concentration and also may be taken as an elective. (GBSP-210 or equivalent)
Class 3, Credit 4 (offered annually)

GBSP-448 Industrial Psychology
Registration #0514-448
Consideration of principles and application of, and current research in, industrial psychology, with particular reference to personnel selection, training, motivation, morale, performance appraisal, leadership, and communication. This course is part of the Psychology Concentration and also may be taken as an elective. (GBSP-210 or equivalent)
Class 3, Credit 4 (offered occasionally)

GBSP-449 Behavior Modification
Registration #0514-449
This course will teach you the skills of changing your behavior by controlling your environment and the consequences of your behavior. This course is part of the Psychology Concentration and also may be taken as an elective. (GBSP-210 or equivalent)
Class 3, Credit 4 (offered occasionally)

GBSP-450 Psychology of Women
Registration #0514-450
This course examines religions as cultures which, like other "ways of life," face the task of attracting or creating new members, maintaining their loyalty, providing them with a coherent world view and satisfying their basic needs. It will examine the way religions use education, ritual, rewards, punishment, symbols and other mechanisms of social control and cohesion formation to build and nurture their flocks. In addition it will examine the ways in which religious organizations and their individual members reconcile conflicts between religious and secular norms, world views, loyalties and problem solving strategies. Finally it will suggest how psychological processes such as identity information, attribution, self actualization, brainwashing, conflict, denial, projection, and repression may be applied and misapplied in efforts to understand religious belief and behavior. This course is part of the Perspectives on Religion Concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GBSP-480 Psychology of Women
Registration #0514-480
This course examines the relevance and applicability of present psychological theory to the understanding of the development and behavior of women. Major topics covered include: psychological and biological sex differences, psychological theories of women's development, the relationship between female personality development and various socio-cultural factors, women's place in society, women and their bodies, and women and mental health. This course is part of the Women's Studies Concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GBSP-483 Social Psychology of Religion
Registration #0514-483
This course examines religions as cultures which, like other "ways of life," face the task of attracting or creating new members, maintaining their loyalty, providing them with a coherent world view and satisfying their basic needs. It will examine the way religions use education, ritual, rewards, punishment, symbols and other mechanisms of social control and cohesion formation to build and nurture their flocks. In addition it will examine the ways in which religious organizations and their individual members reconcile conflicts between religious and secular norms, world views, loyalties and problem solving strategies. Finally it will suggest how psychological processes such as identity information, attribution, self actualization, brainwashing, conflict, denial, projection, and repression may be applied and misapplied in efforts to understand religious belief and behavior. This course is part of the Perspectives on Religion Concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GBSP-498 Attitude Formation and Persuasion Techniques
Registration #0514-498
The course will focus on current theories of attitude formation, and seek to apply them to contemporary events to achieve an understanding of how those who wish to shape or change attitudes do so. (GBSP-210 or equivalent)
Class 3, Credit 4 (offered occasionally)
GBSS-442 The Urban Experience
Registration #0515-442
This sociology course analyzes social and spatial characteristics of cities and considers reasons for urban development, ecological factors, types and networks of settlements, and urbanism as a way of life. It also examines the issues of neighborhoods, subareas, ghetto enclaves, metropolitan regions, urban social and political structures, problems, services, and planning. This course is part of the Social Change in a Technological Society Concentration and also may be taken as an elective. (GBSS-210 or GBSA-210)
Class 3, Credit 4 (offered annually)

GBSS-443 Sociology of Work
Registration #0515-443
This sociology course analyzes the essential properties of work, its structure, the group processes involved in it, and its social meaning. The course treats work as emerging, like other social realities, out of social relationships between individuals and groups. It looks at ways in which people can develop a positive self-regard or a sense of alienation in their occupations and professions and various types of work organizations. It also considers leisure as a complement to work. This course is part of the Social Change in a Technological Society Concentration and also may be taken as an elective. (GBSS-210 or GBSA-210 or instructor's permission)
Class 3, Credit 4 (offered annually)

GBSS-444 Social Change
Registration #0515-444
Few people need to be more prepared to deal with social change than professionals in technical fields. In this culture, technology is often at the center of change and technical people are expected not only to cope with change but to help guide it. The purpose of this course is to help RIT students understand and deal with change rather than to simply react to it. This course is part of the Social Change in a Technological Society Concentration and also may be taken as an elective. (GBSS-210 or GBSA-210 or equivalent)
Class 3, Credit 4 (offered annually)

GBSS-446 Sociology of Health
Registration #0515-446
This course is a survey of the sociological aspects of health and illness. Some areas of study will be the definition, causes (etiology) and cure of disease in various societies and social groups. Also included will be a discussion of the epidemiology of disease, access to, and delivery of health care in contemporary U.S. society, problems of patient care and the study of mental illness and death and/or dying. This course is part of the Social Change in a Technological Society Concentration and also may be taken as an elective. (GBSS-210 or GBSA-210 or equivalent)
Class 3, Credit 4 (offered annually)

GBSS-447 Women in Contemporary U.S. Society
Registration #0515-447
This sociology course will examine three major social institutions which shape the lives of women in contemporary U.S. society: the family, the workplace, and political structure. This course is part of the Social Change in a Technological Society Concentration and the Women's Studies Concentration, and also may be taken as an elective. (GBSS-210 or GBSA-210)
Class 3, Credit 4 (offered occasionally)

GBSS-444 Social Change
Registration #0515-444
Few people need to be more prepared to deal with social change than professionals in technical fields. In this culture, technology is often at the center of change and technical people are expected not only to cope with change but to help guide it. The purpose of this course is to help RIT students understand and deal with change rather than to simply react to it. This course is part of the Social Change in a Technological Society Concentration and also may be taken as an elective. (GBSS-210 or GBSA-210 or equivalent)
Class 3, Credit 4 (offered occasionally)
GBSS-448  Minority Group Relations 
Registration #0515-448
This course will deal with the principal concepts and research findings of those who have studied racial and ethnic minorities and their relations. Taking into account the growing body of theory and data on the dynamics of ethnic prejudice and discrimination, the course is concerned with the subcultures of minorities, the nature of prejudice and discrimination, the etiology, patterns and consequences of intergroup conflict, and the reactions of minorities to differential and discriminatory treatment. Concepts such as assimilation, amalgamation, and desegregation will be analyzed as forms of conflict resolution. This course is part of the Social Change in a Technological Society Concentration and the Minority Group Relations Concentration, and also may be taken as an elective. 
Class 3, Credit 4 (offered annually) 

GBSS-449  Population and Society 
Registration #0515-449
Study of demographic variables of mortality, fertility, and migration as they affect the rise and quality of population. This course is part of the Social Change in a Technological Society Concentration and also may be taken as an elective. (GBSS-210 or GBSA-210) 
Class 3, Credit 4 (offered annually) 

GBSS-482  African-American Culture 
Registration #0515-482
This course is designed to analyze past, present and future social policies, programs and practices from their actual and predictable effects on black people. These analyses and solutions will include particular emphasis on how the black community has been forced to develop mechanisms for coping with the debilitating effects of poverty, environmental deprivation, and institutional racism. The course is designed to present a systematic means of facilitating change in people's attitudes and behaviors. This course is part of the Minority Relations Concentration and also may be taken as an elective. 
Class 3, Credit 4 (offered annually) 

GBSS-483  Hispanic American Culture 
Registration #0515-483
This course offers the study of the social experiences and conditions of Hispanic Americans and the degree to which they have been assimilated into the mainstream dominant culture. Various Hispanic groups will be studied with the goal of defining and outlining their differences and similarities. The Puerto Ricans in the Northeast and the Mexican-Americans in the Southwest will be specifically selected for analysis. The course will help students to better understand the problems faced by Hispanic Americans by looking at specific socio-economic indicators such as: their access to health care, job opportunities, educational institutions, and the degree to which Hispanics have "progressed" in the U.S. This course is part of the Minority Relations Concentration and also may be taken as an elective. 
Class 3, Credit 4 (offered annually)

GBSS-506  Social Inequality 
Registration #0515-506
This is a survey course that will examine different dimensions of stratification in the U.S. and elsewhere. Explanations for the existence of inequality will be addressed at individual, group and institutional levels. 
Class 3, Credit 4 (offered occasionally) 

GBSS-507  Complex Organizations 
Registration #0515-507
This course analyzes the structure and dynamics of a wide variety of social organizations (government bureaucracies, corporations, and voluntary groups). Topics discussed will include theories of organization, organizational processes, technological impact and organizational change and development. An examination of the internal operation of large organizations will include sources of power and authority, modes of communication, division of labor as well as tension, stress and strain.
Class 3, Credit 4 (offered occasionally) 

GBSS-508  Aging and Society 
Registration #0515-508
This course considers concepts, issues, and research techniques in the behavioral and biological aspects of aging. It examines the interaction of group processes in the family and community which influence society's attitudes toward the aging process. It further examines the cultural, environmental and institutional changes as they relate to an increasing population of older people. 
Class 3, Credit 4 (offered annually) 

GBSS-509  Social Policy 
Registration #0515-509
An examination of social policy formulation in a variety of contexts from local government to national government. Special attention will be given to the strategies, choices and priorities in the formulation of social policy. The course will deal with historical development of social policies including the issues of health, aging, poverty, family and children. The course also will examine the question of how social values and economy influence policy development. 
Class 3, Credit 4 (offered occasionally) 

GBSS-510  Juvenile Justice 
Registration #0515-510
The philosophical, historical and operational aspects of the juvenile justice system; evaluation of the social and personal factors related to juvenile delinquency; the role of police, the courts, corrections and community programs in delinquency prevention, control and treatment. 
Class 3, Credit 4 (offered annually) 

GBSS-513  Criminology 
Registration #0515-513
A survey of the field of criminology with emphasis on major forms of contemporary crime, definition of crimes and criminality, the extent of crime, criminal typologies, and fundamental aspects of the social control of crime. 
Class 3, Credit 4 (offered annually) 

GBSS-515  Social Policy and the Aging 
Registration #0515-515
This course will be organized around culture and values as context for policy formulation. Special attention will be given to the process of policy analysis and implementation. Several specific policy areas will be examined: social security and income maintenance; health and long-term care; work and retirement; social services and the aging network; housing and living arrangements for the elderly; and the role of the family and the elderly. 
Class 3, Credit 4 (offered annually)
GBSS-524  Applied Sociology
Registration #0515-524
This course is an effort to provide the student with useful sociological knowledge applicable to solutions of practical problems. The inventory of problems is not fixed beforehand, and the specific course content reflects the problems either already encountered by students or very likely to represent a significant portion of their anticipated professional concern upon graduation. (Permission of instructor)
Class 3, Credit 4 (offered annually)

GBSS-569  Human Sexuality
Registration #0515-569
This course is designed to be sex positive in its approach to the study of human sexual behavior. It will focus upon basic physiology, sexual awareness, sexual development throughout the life cycle, sex roles, sexual myths, legal and social issues, pre-marital and marital sexual behavior, and alternative sexual choices. Frequently these issues raise questions of sexual attitude and value and these will be examined and clarified.
Class 3 + 2 hr. weekly seminar, Credit 4 (offered biannually)

Social Science

Economics

GSSE-440  Urban Economics and Public Policy
Registration #0511-440
Urban economics is the application of economic analysis to spatial relationships in densely populated (urban) areas. The first part of the course develops economic models which explain the location behavior of consumers and businesses in cities. The second part of the course is issue-oriented, applying the insights gained in the first part to a number of urban problems. This course is part of the Economics Concentration and also may be taken as an elective. (GSSE-301)
Class 3, Credit 4 (offered annually)

GSSE-441  Economics of Human Resources
Registration #0511-441
The microeconomic study of human resources encompasses aspects of human involvement in the production and distribution of goods and services. Potential topics are labor force participation, economics of employment discrimination, primary and secondary education, higher education, distribution of income and wealth, poverty and income maintenance, manpower planning, and microeconomic analysis of the work/leisure decision. This course is part of the Economics Concentration and also may be taken as an elective. (GSSE-301)
Class 3, Credit 4 (offered annually)

GSSE-442  Contemporary International Economic Problems
Registration #0511-442
This course aims to prepare the student to deal with foreign exchange market, international trade decisions, the macroeconomic effects of trade on domestic economies, and the effects of domestic business fluctuations on international trade and finance of each country. Though the course is basically a theory course in economics, the applied aspects of international trade and finance are emphasized. This course is part of the Economics Concentration and also may be taken as an elective. (GSSE-301)
Class 3, Credit 4 (offered annually)

GSSE-443  Current American Macroeconomic Problems
Registration #0511-443
This course is an in-depth analysis of selected macroeconomic problems such as economic growth, inflation, and business cycles. The primary focus is consideration of current macroeconomic theory and policy application in the context of the U.S. economic problems, e.g., tax-based incomes policies, wage-price controls. This course is part of the Economics Concentration and also may be taken as an elective. (GSSE-301)
Class 3, Credit 4 (offered annually)

GSSE-444  Public Finance
Registration #0511-444
This course is a study of the economics of the public sector. Topics include but are not limited to: taxation and public expenditures and their effect on the allocation of resources, distribution of income, and employment; market failure; public goods; the economics of public choice; and the application of public finance principles and normative questions to public economic issues. This course is part of the Economics Concentration and also may be taken as an elective. (GSSE-301)
Class 3, Credit 4 (offered annually)

GSSE-445  Survey of Economic Thought
Registration #0511-445
This course is a survey of the various schools of thought which have developed in economics from the late eighteenth century up to the present. Representative economists from each of the major schools (Classical, Marxian, Neo-Classical, Keynesian, Monetarist, etc.) are studied. This course is part of the Economics Concentration and may also be taken as an elective. (GSSE-301)
Class 3, Credit 4 (offered annually)

GSSE-446  Economics, Public Policy and Competition
Registration #0511-446
This course is a study of society's responses to imperfections in an otherwise competitive marketplace. Economic analysis, along with some legal analysis, is used to examine not only the problems but also some solutions to such problems as monopolies, externalities, and other forms of market failure. Responses examined include: regulation, antitrust, public enterprise, and other forms of government action. This course is part of the Economics Concentration and also may be taken as an elective. (GSSE-301)
Class 3, Credit 4 (offered annually)

GSSE-448  Economics of Less Developed Countries
Registration #0511-448
This course introduces students to the economic problems of less developed countries (LDC). Students study the historical causes of underdevelopment gap between developed and underdeveloped countries, and the theories and the policies aimed at accelerating the rate of growth in LDC. In addition, the role of international organizations in the economic development of LDC is discussed. This course is part of the Global Studies Concentration and the Economics Concentration and may also be taken as an elective. (GSSE-301)
Class 3, Credit 4 (offered annually)
This course provides a comparative analysis of different economic systems. The three major economic systems to be studied are the Capitalist Mode of Production, the Planned Economy, and the Mixed Economy. The student will study the economic decision-making process in each system including the economic structure, operation, and relative efficiency in achieving its macroeconomic goals. Upon completion of this course, the student will be able to critically evaluate each economic system, recognize the advantages and disadvantages of each, and propose general policy recommendations to improve each system's relative efficiency. This course is part of the Global Studies Concentration and the Economic Concentration and also may be taken as an elective. (GSSE-301)

Class 3, Credit 4 (offered annually)

**GSSE-450 Benefit-Cost Analysis Registration #0511-450**

This course explores the use and abuse of benefit-cost and related analytical techniques commonly encountered in economic policy making. Many expenditure and regulatory programs of governmental agencies now are routinely evaluated in a benefit-cost or cost-effectiveness framework, and debate about policy decisions increasingly draws upon benefit-cost findings. Yet application of benefit-cost analysis often attracts much controversy, in part because of disagreements about how to conduct such analysis and about the role that economic efficiency should play in societal decisions. The mechanics, power, and limitations of this form of analysis form the primary elements of the course. It is part of the Economics Concentration and also may be taken as an elective. (GSSE-301)

Class 3, Credit 4 (offered annually)

**GSSE-451 Forensic Economics Registration #0511-451**

Forensic economics is the application of economics to the law. A major subset of this discipline involves the determination of economic damages resulting from personal injury and wrongful death. More recently, forensic economists have been involved in measuring damages arising from malpractice claims, division of marital property in divorce cases and the determination of damages resulting from loss of employment. In addition, a major obstacle faced by the forensic economists involves the methodological issues in determining damages. Analysis of these and other issues will be the foundation of this course. This course is part of the Economics Concentration and also may be taken as an elective. (GSSE-301)

Class 3, Credit 4 (offered annually)

**GSSE-480 The Economic Role of Women Registration #0511-480**

This course is intended to analyze the economic role of women in today's society. This analysis includes the economic role of women in the labor force, as owners of other factors of production, and in business decision-making process. The impact of the changing role of women on GNP, labor market, and other economic variables is elaborated. Through the analysis of some economic models and their application to real world situations, it is shown that the social, political, and individual equality of women depends, to a great extent, on their economic role in family and society.

Class 3, Credit 4 (offered on sufficient demand)

**GSSE-481 Environmental Economics Registration #0511-481**

The course will examine 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. This course is part of the Environmental Studies Concentration and the Economics Concentration and also may be taken as an elective. (GSSE-301)

Class 3, Credit 4 (offered annually)

**Political Science**

**GSSE-211 American Politics Registration #0513-211**

This course is a study of the American national political system, its theoretical foundations and institutions, and the contemporary issues which confront it.

Class 3, Credit 4 (offered quarterly)

**GSSE-215 Ideology and the Political Process Registration #0513-215**

This course examines major ideological concepts and how these are operationalized through the political processes of various governmental structures.

Class 3, Credit 4 (offered quarterly)

**GSSE-440 International Relations Registration #0513-440**

This course critically analyzes the structure and principles of the international system with emphasis on the tensions between the imperatives of power politics and the requirements of law and justice. This course is part of the International Relations Concentration, the Global Studies Concentration, the Peace Studies Concentration and also may be taken as an elective. (GSSE-211 or GSSE-215 or equivalent)

Class 3, Credit 4 (offered annually)

**GSSE-441 Politics in China Registration #0513-441**

This course is designed to provide the students with the political dynamics of the People's Republic of China. Major emphasis will be given to the historical background, major aspects of the political systems, and the foreign relations of China. This course is part of the International Relations Concentration and the Foreign Language/Culture Study Concentration and also may be taken as an elective. (GSSE-211 or GSSE-215)

Class 3, Credit 4 (offered annually)

**GSSE-442 Government and Politics of Russia and the C.I.S. Registration #0513-442**

This course provides an analysis of the politics and governmental systems in Russia and the former republics of the Soviet Union that now comprise the Commonwealth of Independent States (C.I.S.). Emphasis will be on the dynamics of political, economic, and social change, as well as political leadership and contemporary issues. This course is part of the International Relations Concentration and also may be taken as an elective. (GSSE-211 or GSSE-215 or equivalent)

Class 3, Credit 4 (offered annually)
GSSM-443 Foreign Policy of Russia and the C.I.S. Registration #0513-443
This course critically examines fundamental elements of the foreign policy of Russia and the Commonwealth of Independent States (C.I.S.) from the Soviet era to the present. Special emphasis will be given to the geopolitical, economic, and ideological forces affecting national interests, as well as analyses of the mechanics of foreign policy formulation and its implementation with respect to the United States, Europe, China, the Third World, Middle East, and inter-commonwealth. This course is part of the International Relations Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215)
Class 3, Credit 4 (offered annually)

GSSM-444 The Cold War Registration #0513-444
This course is an examination of the origins and evolution of the Cold War with the major emphasis upon the Soviet-American rivalry in the post World War II era. This course is part of the International Relations Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)
Class 3, Credit 4 (offered annually)

GSSM-445 Comparative Politics Registration #0513-445
This 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 western democracies, communist, or 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. This course is part of the International Relations Concentration and the Global Studies Concentration, and also may be used as an elective.
Class 3, Credit 4 (offered annually)

GSSM-450 State and Local Politics Registration #0513-450
This course is a study of politics and government on the state and local levels, and the relationships between these levels and the federal government. It will illustrate differences in state governments by comparing other states to New York, and will use the Rochester area for comparisons with local governments found elsewhere. This course is part of the American Politics Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)
Class 3, Credit 4 (offered annually)

GSSM-451 The Legislative Process Registration #0513-451
This course examines the role of the legislature in the U.S. political process. The primary emphasis will be the study of the U.S. Congress, but some attention also will be directed to state legislatures. Topics to be studied include elections, party organization, committees, interest group activities, and executive-legislative relations. This course is part of the American Politics Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)
Class 3, Credit 4 (offered annually)

GSSM-452 The American Presidency Registration #0513-452
This course is a study of the role of the presidency in the American political system. Among the topics to be considered are: the nomination and election process, evolution, expansion and limitation of presidential powers, factors in decision making, and the various leadership functions performed by the American Presidency. This course is part of the American Politics Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)
Class 3, Credit 4 (offered annually)

GSSM-453 American Foreign Policy Registration #0513-453
A study of the formulation and execution of American foreign policy, including the examination of the instruments, procedures and philosophies shaping the development and implementation of foreign policy. This course is part of the American Politics Concentration and the International Relations Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)
Class 3, Credit 4 (offered annually)

GSSM-454 Political Parties and Voting Registration #0513-454
Political parties are a crucial part of the democratic process. Parties serve as a critical link between citizens and their government, as parties promote policies favored by their voters. This course studies parties; their history, their future and their role in the democratic process. Its overall emphasis is on the degree to which parties perform or fail to perform as links between citizens and government. This course is part of the American Politics Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)
Class 3, Credit 4 (offered annually)

GSSM-455 Politics and Public Policy Registration #0513-455
This is a course in the politics of the policy process. The basic questions of the course are: 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? This course is part of the American Politics Concentration and also may be taken as an elective (GSSM-211 or GSSM-215 or equivalent)
Class 3, Credit 4 (offered annually)

GSSM-456 The Judicial Process Registration #0513-456
This course examines the structure and function of the state and federal courts in the American political system. This course is part of the American Politics Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215)
Class 3, Credit 4 (offered annually)
GSSM-457  
**Constitutional Law**  
Registration #0513-457  
This course has been designed to provide the student with a basic understanding of the constitutional principles frequently encountered in the criminal justice profession. Landmark court decisions relating to due process, equal protection, unlawful arrest, unreasonable search and seizure, compulsory self-incrimination, the assignment of counsel, and fair trial guarantees are discussed and critically evaluated. This course is part of the American Politics Concentration and also may be taken as an elective.  
Class 3, Credit 4

GSSM-502  
**Politics of Developing Countries**  
Registration #0513-502  
Since World War II more than 100 new countries have joined the global political system and they are searching for appropriate political means to serve their societies' ends. In addition, many older and established countries have been struggling to adjust their political arrangements to cope more effectively with modern problems. Several elements are involved in this complex process: social mobilization, economic development, and political modernization. This course will focus on the political problems of the developing countries which occupy roughly the southern half of the earth's land mass.  
Class 3, Credit 4 (offered occasionally)

GSSM-504  
**20th Century America**  
Registration #0513-504  
An examination of the major political, social and economic developments affecting the United States in the 20th century. Emphasis will be placed upon the reactions of the various presidential administrations to conditions in both the domestic and foreign fields.  
Class 3, Credit 4 (offered occasionally)

GSSM-514  
**Theories of Political Systems**  
Registration #0513-514  
An examination of the basic questions in political theory, a survey of the major political philosophers, and an inquiry into the major political ideologies.  
Class 3, Credit 4 (offered occasionally)

GLAI-501  
**Senior Seminar**  
Registration #0520-501  
This course enables students to sharpen and demonstrate their ability to define a research task or problem, gather and evaluate scholarly evidence and present their findings in a paper or project. While the content and focus of the seminar will change from year to year, it will always direct student attention toward a broad issue or aspect of contemporary culture and equip them to understand that subject more fully, investigate one facet of it in depth, and provide an advanced experience of problem solving and value clarification.  
Class 3, Credit 4 (offered occasionally)

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.  
Credit variable (offered annually)

Service Courses

Service courses are required courses offered by the College of Liberal Arts for specific professional departments. These courses may not be taken for Liberal Arts credit.

GLAA-201,202,203  
**History of Airpower**  
Registration #0519-201, 202,203  
This course is a study of the development of airpower from its origins to the present. This course deals with the impact of airpower upon 20th century warfare. It also traces the evolution of airpower as a factor in military and nonmilitary operations in support of U.S. foreign and domestic policy.  
Class 1 (201, Credit 1); (202, Credit 2); (203, Credit 1) (offered annually)

GSSM-401  
**National Security Forces in Contemporary American Society I**  
Registration #0513-401  
This course will examine the sociology aspects of officership, the military criminal justice system, and introduce National Security Policy. Topics of interest focus on the military as a profession, officership, Air Force doctrine, civilian control of the military, and a comparison of the military/civilian justice systems. (Approval of the Aerospace Studies Department)  
Class 4, Credit 5 (offered annually)

GSSM-402  
**National Security Forces in Contemporary American Society II**  
Registration #0513-402  
This course will examine the American National Security Policy by analysis of the evolution of the American defense strategy and policy. Topics include methods for managing conflict, international terrorism, alliances and regional security, an analysis of arms control and the threat of war, and the formulation of American defense policy and strategy. (Approval of the Aerospace Studies Department)  
Class 3, Credit 4 (offered annually)

GLAI-201  
**Seminar: Academic Fields of Study (Tech. and Lib. Studies)**  
Registration #0520-201  
This seminar is designed to introduce students to the full array of degree programs offered by RIT. Although it is part of a student's exploration of career possibilities, the focus will be on fields of study necessary for particular careers rather than on the ultimate career activity itself. The presupposition is that interest in a field of study is necessary to career success, but also that any one field of study can lead to a variety of career choices.  
Class 3, Credit 4 (offered occasionally)
GLLC-301,302  College Writing I, II
Registration #0502-301,302
This course sequence develops minimal college-level writing
competencies. The credits earned, however, may not comprise
part of the student's normal Liberal Arts curriculum. Furthermore,
this sequence may not be substituted for English Composition.
Class 1, Credit 1 (offered quarterly)

GPTC-402  Conference Techniques
Registration #0502-402
Basic theories of conference techniques including leadership,
participation, types, and functions of public and private con-
ferences and their evaluation. Student participation in training,
problem solving, and informational-developmental conferences.
Class 4, Credit 4 (offered annually)

GPTC-403  Effective Technical Communication
Registration #0535-403
This course provides knowledge and practice of written and oral
communication skills generally required in technical professions.
Focus is on individual and group writing and speaking tasks. All
written work must be prepared on word processor.
Class 3, Credit 4 (offered annually)

GLLC-404  Communication with the Handicapped
Registration #0502-404
An examination of the communication difficulties with the
handicapped: specifically the deaf, blind and others with physical
handicaps. To include interpersonal, family, social and re-
habilitation modes of communication. (GSSP-210)
Class 3, Credit 4 (offered occasionally)

GSSE-301  Principles of Economics I
Registration #0511-301
This is the first course in a two-quarter sequence designed to in-
troduce the student to the basic principles of economics. This
course will focus on basic economic concepts and macroeco-
nomics. Topics of primary interest include economic method-
ology, the economizing problem, capitalist ideology, supply and
demand, national income accounting, income determination,
inflation, money, and the role of government in the economy.
Other topics in basic economics will be selected by the instructor.
Class 3, Credit 4 (offered quarterly)

GSSE-302  Principles of Economics II
Registration #0511-302
This is the second course in a two-quarter sequence designed to
introduce the student to the basic principles of economics. This
course will focus on microeconomics. Topics of primary interest
include market structure, supply and demand analysis involving
elasticity, the theory of cost in the short and long run, perfect
competition, monopoly, monopolistic competition oligopoly,
marginalist distribution theory, the labor market, and general
equilibrium analysis. Other topics in microeconomics will be
selected by the individual instructor.
Class 3, Credit 4 (offered quarterly)

GLLZ-200  Basic Communications
Registration #0518-200
Students will gain an understanding of deafness, plus basic skills
which will permit communication with a segment of the deaf
population.
Class 3, Credit 4 (offered on sufficient demand)

GLLZ-201,202, 203  Manual Communication
Registration #0518-201, 202,203
A course designed to provide the student with the basic
vocabulary of frequently used signs and the American manual
alphabet.
Class 3, Credit 4 (offered on sufficient demand)
College of Science

Biology

SBIB-200 Freshman Symposium
Registration #1001-200
Introduction to academic and student life in the Biology Department.
Class 1.5, Credit 1 (F)

SBIB-201 General Biology
Registration #1001-201
Characteristics and origin of life; basic principles of modern cellular biology including cell organelle structure; chemical basis and functions of life including enzyme systems, cellular respiration and photosynthesis; nutrient procurement in plants and animals.
Class 3, Credit 3 (F)

SBIB-202 General Biology
Registration #1001-202
A study of the physiological processes of gas exchange, internal transport, osmoregulation, excretion, and hormonal control in plants and animals; nervous system and behavior in animals.
Class 3, Credit 3 (W)

SBIB-203 General Biology
Registration #1001-203
A study of cellular and organismal reproduction, the principles of genetics and developmental biology, introduction to evolution and ecology.
Class 3, Credit 3 (S)

SBIB-205,206,207 General Biology Laboratory
Registration #1001-205,206, 207
Laboratory work to complement the lecture material of General Biology (SBIB-201, 202, 203). The experiments are designed to illustrate concepts, develop laboratory skills and techniques, and improve ability to make, record and interpret observations. (Corequisite SBIB-201, 202, 203)
Lab 3, Credit 1 (F, W, S)

SBIB-230 Introduction to Co-op Seminar
Registration #1001-230
Exploration of cooperative education opportunities in the biological sciences. Practice in writing letters of application, resume writing, and interviewing procedures.
Class 1, Credit 1 (W)

SBIB-301 Invertebrate Zoology
Registration #1001-301
Biology of invertebrate animals with emphasis on phylogeny and functional morphology. (One year of general biology or permission of instructor) (F)
Class 3, Lab 3, Credit 4

SBIB-302 Vertebrate Zoology
Registration #1001-302
Morphology, physiology, behavior, classification, and ecology of chordates. (One year of general biology)
Class 3, Lab 3, Credit 4 (Not offered in 1992-93)

SBIB-303 Comparative Vertebrate Anatomy
Registration #1001-303
A comparative study of the organ systems of representative members of the vertebrates with emphasis on structural changes which occur during evolution. (One year of general biology)
Class 3, Lab 6, Credit 5 (F)

SBIB-304 Botany
Registration #1001-304
Distribution of the major groups of plants and their adaptations to their particular environment. (One year of general biology or permission of instructor)
Class 3, Lab 3, Credit 4 (F)

SBIB-305 Physiology and Anatomy
Registration #1001-305
An integrated approach to the structure and function of the nervous, endocrine, integumentary, muscular and skeletal systems. Laboratory exercises include histological examination, anatomical dissections and physiological experiments with human subjects. (One year of general biology or permission of instructor for non-science majors)
Class 4, Lab 3, Credit 5 (F)

SBIB-306 Physiology and Anatomy
Registration #1001-306
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. (SBIB-305 or permission of instructor)
Class 4, Lab 3, Credit 5 (W)

SBIB-310 Plant Physiology
Registration #1001-310
Physiological phenomena in the growth and development of higher plants. Water relationships, photosynthesis, translocation, mineral nutrition, growth, hormonal control and reproduction. (One year of general biology and one year of organic chemistry)
Class 3, Lab 3, Credit 4 (F, W)

SBIB-311 Cell Biology
Registration #1001-311
Principles of cell biology—including internal cell structure, cell cycle and growth control, cell interactions, cell differentiation, and the extracellular matrix—with an emphasis on the observations and experimental evidence supporting them. (One year of general biology or equivalent)
Class 4, Lab 0, Credit 4 (Not offered in 1992-93)

SBIB-320 Histology
Registration #1001-320
Detailed microscopic studies on the structure and function of normal human tissues. (One year of general biology; SBIB-305, 306, recommended)
Class 3, Lab 3, Credit 4 (F)

SBIB-330 Small Animal Laboratory Techniques
Registration #1001-330
A course designed to prepare the student for small animal handling, biological administrations and preparations, minor surgery and autopsies. (3rd-, 4th-, 5th-year status and permission of instructor)
Class 1, Lab 3, Credit 3 (S)
SBIB-340 General Ecology
Registration #1001-340
Introduction to ecosystem ecology stressing the dynamic interrelationships of plant and animal communities with their environments. A study to include such ecological concepts as energy flow and trophic levels in natural communities, plant responses and animal behavior, population dynamics, biogeography and representative ecosystems. (One year of general biology)
Class 3, Lab 3, Credit 4 (F)

SBIB-350 Molecular Biology
Registration #1001-350
The study of structure, function, and organization of proteins, nucleic acids and other biological macromolecules. (One year of general biology, SCHO-233, second- or third-year status)
Class 3, Lab 3, Credit 4 (W, S)

SBIB-360 Horticulture
Registration #1001-360
A basic introduction to horticulture with a study of the interconnections of plants, gardens and their environment and discussion relating to applications of principles to indoor and outdoor gardening.
Class 3, Lab 3, Credit 4 (S)

SBIB-370 Biological Writing
Registration #1001-370
Written technical communication in the biological sciences with emphasis on components of report writing: analysis, definition, description, instruction, data presentation, literature research, abstracting and editing. (Third-, fourth-, fifth-year status)
Class 1, Rec. 1, Credit 2 (F, W, S)

SBIB-380 Human Gross Anatomy
Registration #1001-380
This course is designed to expose students to details of human anatomy through cadaver dissection. Lecture material stresses functional and clinical correlates corresponding to laboratory exercises. (SBIB-305, 306 and permission of instructor)
Class 2, Lab 6, Credit 4 (W)

SBIB-390 Vertebrate Evolution
Registration #1001-390-01
Study of the major changes in vertebrate functional morphology through time, beginning with fish and ending with humans; fossil evidence depicting major transitions between the vertebrate classes; modern taxonomy, including cladistic analysis, geologic time, and stratigraphy; and plate tectonics. (One year of General Biology or equivalent)
Class 3, Lab 0, Credit 3 (W)

SBIB-402,702 Immunology
Registration #1001-402
Investigation of the basic concepts of immunology (antigens, antibodies, immunologic specificity, antibody synthesis, and cell-mediated immunity) and the applications of immunology to infectious diseases, allergic reactions, transplantations, tumors, autoimmune diseases, immunosuppression and tolerance. (One year of general biology)
Class 3, Credit 3 (F)

SBIB-403 Cell Physiology
Registration #1001-403
Functional eucaryotic cytology, nuclear and cytoplasmic regulation of macromolecular synthesis, exchange of materials across cell membranes, regulation of cellular metabolism and control of cell growth. (SBIB-350)
Class 3, Lab 3, Credit 4 (F, S)

SBIB-404 Introductory Microbiology
Registration #1001-404
Introduction to microorganisms and their importance. Principles of structure, metabolic diversity, taxonomy, environmental microbiology, and infectious diseases of procaryotes will be discussed. Basic laboratory techniques, microscopy, staining, bacterial identification, and food testing. (SBIB-350, one year of general biology and one year of organic chemistry)
Class 3, Lab 4, Credit 5 (F, W)

SBIB-405 Microbial Pathogenesis
Registration #1001-405-01
Mechanisms of bacterial, fungal, viral, and parasitic diseases to include host response to invasion of pathogens, subversion of host defenses, virulence factors, and various prominent infectious diseases. (SBIB-404)
Class 3, Lab 0, Credit 3 (W)

SBIB-407 Microbial and Viral Genetics
Registration #1001-407
The study of the molecular genetics of bacteria, bacteriophages, fungi, and eucaryotic viruses. (SBIB-350, 421; SCHO-334)
Class 3, Lab 3, Credit 4 (F, S)

SBIB-417 Industrial Microbiology
Registration #1001-417
Practical applications of yeasts, fungi and bacteria in industrial fermentations. Industrial aspects of fermentor design, pilot plan operations, strain development, and recovery of fermentation end products. Microbiology, biochemistry and engineering of large-scale processes. (SBIB-404 and one biochemistry course)
Class 3, Lab 3, Credit 4 (W, S)

SBIB-420 Plant Ecology
Registration #1001-420
A consideration of the nature and variation of plant communities with a discussion of factors which limit, maintain, and modify communities both locally and regionally. Laboratories will involve field studies of various plant communities and the gathering and analysis of data. (SBIB-340)
Class 3, Lab 3, Credit 4 (Not offered in 1992-93)

SBIB-421 Genetics
Registration #1001-421
Introduction to the principles of inheritance; the study of genes and chromosomes at molecular, cellular, organismal, and population levels. (SBIB-350)
Class 3, Lab 3, Credit 4 (F, S)

SBIB-422 Developmental Biology
Registration #1001-422-01
Study of the processes of growth, differentiation, and development that lead to the mature form of an organism. (One year of General Biology or equivalent)
Class 3, Lab 3, Credit 4 (W)
SBIB-424 Descriptive Embryology
Registration #1001-424
Study of the developmental processes leading to the mature vertebrate form, with emphasis on early human development and its clinical variations. Course requires extensive use of independent study materials. (One year of introductory biology or permission of instructor)
Class 2, Credit 4 (F)

SBIB-430 Radiation Biology
Registration #1001-430
Effects of radiation upon living tissue, both harmful and beneficial. Morphological changes, genetic effects, and pathological changes in both plant and animal tissues. Use of radioisotopes in plant and animal research. (Minimum of 20 credits in biological science)
Class 3, Lab 3, Credit 4 (W)

SBIB-431 Histological Techniques
Registration #1001-431
Preparation of plant and animal tissues on slide mounts. Techniques in paraffin and frozen sectioning. Sectioning on the rotary and sliding microtomes and multiple staining techniques. (One year of general biology)
Class 1, Lab 4, Credit 3 (Not offered in 1992-93)

SBIB-442 Hybridoma Techniques
Registration #1001-442
Designed to acquaint each student with the basic methods employed in the production of hybridoma cell lines and monoclonal antibodies. To include preparation of viable cell suspensions, cell culture fusion techniques, cloning, and monoclonal antibody production and characterization.
(SBIB-445)
Lab 3, Credit 2 (W, S)

SBIB-445 Tissue Culture
Registration #1001-445
Study of the techniques and applications of culturing cells, tissues, and organs in vitro. Emphasis on mammalian systems. (One year of general biology)
Class 2, Lab 3, Credit 4 (F, W)

SBIB-446 Plant Tissue and Cell Culture
Registration #1001-446
Study of the techniques and applications of plant organ, tissues, and cell culture in vitro, with emphasis on plant regeneration and protoplast manipulation. (One year of general biology)
Class 2, Lab 3, Credit 4 (W, S)

SBIB-450 Genetic Engineering
Registration #1001-450
Introduction to the theoretical basis, laboratory techniques, and applications of gene manipulation. (SBIB-350, 404)
Class 3, Lab 6, Credit 5 (W, S)

SBIB-451 Microbial Pathogenesis
Registration #1001-451
Mechanisms of bacterial, fungal, viral, and parasitic diseases; host response to pathogen invasion, subversion of host defenses, virulence factors, examples of infectious diseases. (SBIB-404 required; SBIB-334 recommended)
Class 3, Lab 0, Credit 3 (W)

SBIB-460 Basic Pathology
Registration #1001-460
Introduction to pathophysiology and its consequences, basic mechanisms of disease from the clinical perspective, pathologic processes with clinical correlations. (One year of general biology or equivalent required; SBIB-305, 306 strongly recommended)
Class 3, Lab 0, Credit 3 (S)

SBIB-471 Freshwater Ecology
Registration #1001-471
A study of the physics, chemistry and biology of inland waters. The course will emphasize the physical and chemical properties of water and how these properties affect the associated biological communities. Planktonic, benthic and littoral communities will be considered. Field trips to streams and lakes will be conducted to gather physical, chemical and biological data. (SBIB-340 or permission of instructor)
Class 3, Lab 3, Credit 4 (W)

SBIB-472 Introduction to Oceanography
Registration #1001-472
An introduction to the study of the world ocean, with emphasis on fundamental principles, concepts and processes of biological, geological, chemical, and physical oceanography. (SBIB-340 or permission of instructor)
Class 4, Lab 0, Credit 4 (Not offered in 1992-93)

SBIB-473 Marine Biology
Registration #1001-473
The biology of marine life, with emphasis on the roles that marine plants and animals assume in their environmental situations, and the structural and physiological adaptations necessary to fulfill those roles. (Minimum of 20 credits in biological science)
Class 3, Lab 3, Credit 4 (S)

SBIB-490 Transmission Electron Microscopy
Registration #1001-490
A lecture/laboratory course covering operation, maintenance and calibration of transmission electron microscopes; preparation of biological, chemical and physical specimens for the transmission electron microscope; black-and-white photographic darkroom techniques. (Fourth- or fifth-year status and permission of instructor)
Class 1, Lab 6, Credit 4 (Not offered in 1992-93)

SBIB-491 Scanning Electron Microscopy
Registration #1001-491
A lecture/laboratory course covering operation, maintenance and calibration of scanning electron microscopes; preparation of biological, chemical and physical specimens for the scanning electron microscope; black-and-white photographic darkroom techniques. (Third-, fourth- or fifth-year status)
Class 1, Lab 6, Credit 4 (Not offered in 1992-93)

SBIB-541, 542, 543 Biology Research
Registration #1001-541,542,543
Faculty directed projects of research usually involving original field or laboratory work encompassing a period of at least two quarters. Final results are presented in written and oral formats. (Third-year status with a GPA of 2.5 in science and mathematics courses, and consent of faculty)
Class variable, Credit variable (F, W, S)
SBIB-550 Biology Seminar
Registration #1001-550
Written and oral reports and their discussion by class members covering topics of current interest in the biological sciences. (40 quarter credits in biology and successful completion of the departmental writing requirement)
Class 2, Credit 2 (W, S)

SBIB-559 Special Topics: Biology
Registration #1001-559
Advanced courses which are of current interest and/or logical continuations of the courses already being offered. These courses are structured as ordinary courses and have specified pre-requisites, contact hours and examination procedures.
Class variable, Credit variable (offered upon sufficient request) (F, W, S)

SBIB-599 Independent Study: Biology
Registration #1001-599
Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature. (One year of general biology)
Class variable, Credit variable (F, W, S)

SBIB-720 Introduction to Pharmacology
Registration #1001-720
A survey of the pharmacodynamic properties and physiological effects of drugs used clinically to treat disease. Emphasis will be placed on anti-cancer drugs, antibiotics, and drugs which will affect the central and peripheral nervous systems. (SBIB-305, 306 or equivalent; SBIB-403; SCHO-233)
Class 3, Credit 3 (Not offered in 1992-93)

SBIB-721 Introduction to Pharmacology Laboratory
Registration #1001-721
Laboratory work to accompany the lectures in Introduction to Pharmacology. (Corequisite SBIB-720)
Lab 3, Credit 1 (Not offered in 1992-93)

NOTE: The following courses may not be taken for biology credit by biology or biotechnology majors.

SBIG-210 Microbiology in Health and Disease
Registration #1004-210
An introduction to microorganisms; their relationship to the environment and human health; the causes, prevention and treatment of infectious diseases; and the role of microorganisms in the preparation and spoilage of foods. (One year of high school biology or equivalent)
Class 4, Credit 4 (F)

SBIG-211 Human Biology I
Registration #1004-211
A general study of human anatomy and physiology. This course includes discussions of cellular biology, skeletal, muscular, nervous, and endocrine systems.
Class 3, Lab 3, Credit 3 (W)

SBIG-212 Human Biology II
Registration #1004-212
A general study of human anatomy and physiology with emphasis on mechanisms by which the nervous and endocrine systems coordinate and integrate body functions. This second course includes discussion of nutrition, metabolism and respiratory, circulatory, lymphatic, urinary and reproductive systems.
Class 3, Lab 3, Credit 3 (S)

SBIG-231 Human Biology I Laboratory
Registration #1004-231
Laboratory to complement the lecture material of SBIG-211. Experiments are designed to illustrate the dynamic characteristics of cells, tissues, and organ systems.
Lab 3, Credit 1 (W)

SBIG-232 Human Biology II Laboratory
Registration #1004-232
Laboratory for dietetic and medical illustration students complements the lecture material of SBIG-212. Experiments are designed to illustrate the dynamic anatomy and physiology of major organ systems.
Lab 3, Credit 1 (S)

SBIG-289 Contemporary Science: Biology
Registration #1004-289
A study in various biological topics relevant to contemporary problems of society. Topics may include population biology, pollution, disease control, human heredity, contagious diseases, marine biology, bioethics.
Class 4, Credit 4 (F, W, S)

SBIG-315 Medical Genetics
Registration #1004-315
A survey of selected human variations and diseases of medical importance, with emphasis on the underlying genetic principles. (SBIB-203 or equivalent)
Class 2, Credit 2 (S)

Chemistry
NOTE: SCHG courses, except SCHG-309, may not be taken by chemistry or polymer chemistry majors.

SCHA-261 Quantitative Analysis I
Registration #1008-261
An introduction to quantitative analysis: experimental error and statistics, solubility and gravimetric analysis, volumetric analysis, acid-base equilibria and pH, acid-base and complexometric titrations. (Corequisites SCHC-252 and SCHA-265)
Class 4, Credit 4 (offered every year) (W)

SCHA-262 Quantitative Analysis II
Registration #1008-262
Continuation of SCHA-261: fundamentals of electrochemistry, electrodes and potentiometry, redox titrations, electrogravimetric and coulometric analysis, polarography, spectrophotometry, nuclear chemistry, and coordination compounds. (Corequisite SCHA-266) (SCHA-261, 265, SCHA-252)
Class 4, Credit 4 (offered every year) (S)
SCHA-265  Quantitative Analysis I Lab  
Registration #1008-265  
Experimental techniques include using the analytic balance, calibration of glassware, gravimetric determinations, titrations of weak acids and bases, multi-endpoint titrations, isodometric and EDTA titrations, and Gran plots. Emphasis on record keeping and report writing. (Corequisites SCHA-261 and SCHC-252)  
Lab 6, Credit 2 (offered every year) (W)

SCHA-266  Quantitative Analysis II Lab  
Registration #1008-266  
Experimental techniques include potentiometric and photometric determinations and titrations, electrogravimetric analysis, determination of equilibrium constant (weak acids). Emphasis on record keeping and report writing. (Corequisite SCHA-262)  
Lab 6, Credit 2 (offered every year) (S)

SCHA-311  Analytical Chemistry: Instrumental Analysis  
Registration #1008-311  
Elementary treatment of instrumental theory and techniques, properties of light and its interaction with matter; ultraviolet, visible, and infrared absorption spectroscopy; atomic absorption and molecular fluorescence spectroscopy; nuclear magnetic resonance spectroscopy. (Corequisite SCHA-318)  
Class 3, Credit 3 (offered every year) (F-X*, W)

SCHA-312  Analytical Chemistry: Separations  
Registration #1008-312  
Inorganic and organic separations; Raoult's and Henry's Laws; phase rules; distillation; extraction; adsorption and surface effects; chromatography including gas, liquid, column, paper, thin layer, and ion exchange. (Corequisite SCHA-319)  
Class 3, Credit 3 (offered every year) (F, W, S, SR)

SCHA-318  Instrumental Analysis Lab  
Registration #1008-318  
Lab accompanying SCHA-311. Quantitative and qualitative experiments in ultraviolet, visible, infrared, fluorescence, and atomic absorption spectroscopies. Laboratory report writing is emphasized. (Corequisite SCHA-311)  
Lab 4, Credit 1 (offered every year) (F-X*, W)

SCHA-319  Separations Lab  
Registration #1008-319  
Lab accompanying SCHA-312. Experiments with chemical separation techniques including distillations, extractions and a variety of chromatographic methods (HPLC, thin layer, paper, ion exchange, gas, gel filtration). Laboratory report writing is emphasized. (Corequisite SCHA-312)  
Lab 4, Credit 1 (offered every year) (S, SR)

SCHA-620  Building Scientific Apparatus  
Registration #1008-620  
Basic skills associated with the construction of scientific laboratory apparatus, some of which is not commercially available, will be covered: machine shop skills, working with glass, vacuum technology, optics, and electronics. Special emphasis will be placed on function-structure relationship between an instrument and its intended use. Several references on construction techniques will be provided and information about current manufacturers and suppliers of necessary components will be given. (Corequisite SSEG-621)  
Class 3, Credit 3 (offered upon sufficient request)

SCHB-334  Biochemistry  
Registration #1009-334  
Introduction to biological chemistry. An in-depth survey of the molecular organization, physiological functions and bio-energetic principles of the molecular components of cells, amino acids, proteins, enzymes, carbohydrates, lipids, and nucleic acids. Emphasis is on the structure-function relationships, solution behavior, and metabolism of biomolecules. (SCHO-233)  
Class 4, Credit 4 (offered every year) (F)

SCHB-541,542,543  Biochemistry Research  
Registration #1010-541, 542, 543  
Faculty-directed student projects or research in biochemistry, usually involving laboratory work and/or calculations that would be considered original. (Permission of research advisor)  
Class variable, Credit variable (offered ever year) (F, W, S, SR)

SCHC-200  Chemical Safety  
Registration #1010-200  
A basic course in safe chemical laboratory practices. Topics include protective equipment, toxicity, safe reaction procedures, storage and disposal methods, and handling of all chemicals including flammable materials, compressed gases, cryogens, radioactive materials and other special chemicals.  
Class 1, Credit 1 (offered every year) (F)

SCHC-230  Introduction to Co-op/Chemistry Career Seminar  
Registration #1010-230  
Exploration of cooperative education opportunities with practice in writing letters of application and resumes and in interviewing techniques. Careers related to chemistry and polymer chemistry will be discussed, and career information resources at RIT will be utilized.  
Class 1, Credit 1 (offered every year) (F)

SCHC-251  General Chemistry I  
Registration #1010-251  
A detailed study of fundamental tools of chemistry: properties and measurement, atomic theory, stoichiometry (elements, compounds, reactions), reactions in aqueous solutions, thermochemistry (First Law), and gaseous equilibrium. (Corequisite SCHC-255)  
Class 3, Credit 3 (offered every year) (F)

SCHC-252  General Chemistry II  
Registration #1010-252  
Gas laws, periodic table and periodic trends, quantum theory of electrons, chemical bonding (ionic, covalent, valence bond theory, and hybridization), chemical kinetics, and introduction to organic chemistry. (Corequisites SCHA-261 and SCHA-265)  
Class 3, Credit 3 (offered every year) (W)

*X, extended day (after 5 p.m.)
SCHC-255 General Chemistry I Lab Registration #1010-255
A variety of experimental techniques, including determination of Avogadro's number, qualitative analysis, Job's plot, acid rain, antacid buffers, heats of reaction, syntheses of aspirin and polymers. (Corequisite SCHC-251)
Lab 3, Credit 1 (offered every year) (F)

SCHC-301 Elements of Chemical Research Registration #1010-301
The nature of chemical research will be presented in terms of the concepts, approaches, and procedures. Special attention will be given to methods of keeping research records and notebooks. Opportunities and projects available for undergraduate and graduate research will be described by Department of Chemistry faculty. (Corequisite SCHP-340) (SCHO-431)
Class 1, Credit 1 (offered every year) (F, W)

SCHC-401 Chemical Literature Registration #1010-401
Instruction will be given on the use of chemical literature resources such as Chemical Abstracts, Science Citation Index, Beilstein, Current Contents, and computerized information retrieval. Students will prepare a library-based research paper on a chemical topic of their choice as a culmination of instruction on planning a research paper, outlining, using correct scientific English and formats for documentation (footnotes, endnotes, bibliographies), and preparing visuals, abstracts, and letters of transmittal.
Class 2, Credit 2 (offered every year) (F-X*, W)

SCHC-541,542,543 Chemistry Research Registration #1010-541, 542,543
Faculty directed student projects or research usually involving laboratory work and/or calculations that would be considered original. (SCHC-401 and permission of research advisor)
Class variable, Credit variable (offered every year) (F, W, S, SR)

SCHC-559 Special Topics: Undergraduate Chemistry Registration #1010-559
Courses in which topics of special interest to a sufficiently large group of students, and not covered in other courses, may be offered upon request.
Class variable, Credit variable (offered upon sufficient request)

SCHC-599 Independent Study: Chemistry Registration #1010-599
Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature. (Permission of independent study advisor)
Class variable, Credit variable (offered every year) (F, W, S, SR)

NOTE: SCHG courses, except SCHG-309, may not be taken by chemistry or polymer chemistry majors.

SCHG-202 Survey of Organic Chemistry Registration #1011-202
One quarter survey of the fundamentals of organic chemistry that are essential for an understanding of biological molecules, biochemistry, and the basics of polymer chemistry. Topics covered include alkanes, alkenes, alkynes, aromatics, alcohols, ethers, aldehydes, ketones, carboxylic acids and derivatives, amines, and addition and condensation polymers. (Corequisite SCHG-207) (SCHG-201 or equivalent)
Class 3, Credit 3 (offered every year) (W)

SCHG-203 Biochemistry I Registration #1011-203
Structure and reactions of the major classes of biomolecules are studied. Topics include amino acids and proteins, lipids, carbohydrates and nucleic acids. (SCHG-202 or equivalent)
Class 4, Credit 4 (offered every year) (S)

SCHG-204 Biochemistry II Registration #1011-204
The fundamentals of the metabolism of major classes of biomolecules are covered. Topics include biochemical energetics; the metabolism of carbohydrates, lipids and proteins; and the functions of nucleic acids. (SCHG-203 or equivalent)
Class 4, Credit 4 (offered every year) (F)

SCHG-205 Chemistry I Laboratory Registration #1011-205
Laboratory experiments designed to complement material in first-quarter lectures: analytical balance, volumetric measurements, titrations, syntheses, and analyses. (Corequisite SCHG 201 or 211 or SCHG-215 or 275)
Lab 3, Credit 1 (offered every year) (F, W)

SCHG-206 Chemistry II Laboratory Registration #1011-206
Laboratory experiments designed to complement material in second quarter lectures: visible spectrophotometry, chromatography, anion analysis, thermodynamics, oxidation-reduction, equilibria, and kinetics. (Corequisite SCHG 212 or 216) (SCHG-205)
Lab 3, Credit 1 (offered every year) (W, S)

SCHG-207 Introduction to Organic Chemistry Laboratory Registration #1011-207
An introduction to organic laboratory techniques. Methods of separating, purifying, and characterizing organic compounds are covered. (Corequisite SCHG-202 or 213) (SCHG-205)
Lab 3, Credit 1 (offered every year) (W, S)

SCHG-208 College Chemistry I Registration #1011-208
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, chemical bonding.
Class 4, Credit 4 (offered every year) (F, W)

SCHG-209 College Chemistry II Registration #1011-209
A continuation of SCHG-208. Topics include chemical equilibrium, properties of acids and bases, aqueous equilibria, free energy, entropy and equilibrium, electrochemistry, nuclear chemistry and the chemistry of metals. (SCHG-208)
Class 4, Credit 4 (offered every year) (S)

*X, extended day (after 5 p.m.)
SCHG-211 Chemical Principles I
Registration #1011-211
For science, microelectronics, and photoscience majors and others who desire an in-depth study of general chemistry. Atomic structure and chemical bonding, chemical equations and chemical analysis; gases; acids and bases. (Corequisite SCHG-205)
Class 3, Credit 3 (offered every year) (F, W)

SCHG-212 Chemical Principles II
Registration #1011-212
Problem solving applications of chemical principles. Topics include thermodynamics and equilibrium, oxidation-reduction, and chemical kinetics. (Corequisite SCHG-206) (SCHG-211)
Class 3, Credit 3 (offered every year) (W, S)

SCHG-213 Introduction to Organic Chemistry
Registration #1011-213
Introduction to the structure and reactivities of organic molecules for physical science majors. An overview of the structure, nomenclature, bonding, and reactivities of major functional groups. Special topics will include spectroscopy, organometallics, polymers, and biomolecules. (Corequisite SCHG-207) (SCHG-212)
Class 3, Credit 3 (offered every year) (S)

SCHG-215 General & Analytical Chemistry I
Registration #1011-215
General chemistry for students in biology, medical technology, and the life sciences. Introduction to chemical symbols, formulas, equations, stoichiometry, atomic structure, chemical periodicity and bonding. Emphasis on an early introduction to solutions, concentrations, acid-base and precipitation reactions; analytical chemistry problem-solving applications are stressed. (Corequisite SCHG-205)
Class 3, Recitation 1, Credit 4 (offered every year) (F)

SCHG-216 General & Analytical Chemistry II
Registration #1011-216
Introduction to quantitative gravimetric analysis, oxidation-reduction, nomenclature, chemical equilibrium and equilibria in aqueous solutions. Particular emphasis on solution equilibria including weak acids, bases, buffers, hydrolysis, pH titrations and heterogeneous equilibria. (Corequisite SCHG-206) (SCHG-215)
Class 3, Credit 3 (offered every year) (W)

SCHG-217 General & Analytical Chemistry III
Registration #1011-217
The concepts of polyprotic equilibria, spectrophotometry instrumentation and analyses, electrochemistry, nuclear chemistry and chemical kinetics are presented with an emphasis on the analytical applications of these principles to the life sciences. (Corequisite SCHG-227) (SCHG-216)
Class 3, Credit 3 (offered every year) (S)

SCHG-227 General & Analytical Chemistry Laboratory
Registration #1011-227
Continuation of SCHG-206 laboratory. Topics include pH measurement, buffers and pH indicators, polyprotic acid multi-endpoint titrations, spectrophotometric analysis of equilibrium constants, a redox titration contest, enzyme catalysis, and an independent laboratory practical on the quantitative analysis of an unknown solution by various analytical methods. Experiments are designed to complement lecture material in SCHG-217. Emphasis is on independent laboratory analysis, experimental design, and data analysis. (Corequisite SCHG-217) (SCHG-206)
Lab 6, Credit 2 (offered every year) (S)

SCHG-271 Basic Chemistry I
Registration #1011-271
Basic training in general chemistry assuming no prior experience, concentrating on atomic structure, chemical formulas and reactions, stoichiometry, solutions, acids and bases, and oxidation-reduction (SCHG-205 should be taken concurrently)
Class 3, Credit 3 (offered every year) (F, W)

SCHG-272 Chemistry of Water and Waste Water
Registration #1011-272
Chemistry of water analyses, including solids, pH, alkalinity, acidity, chloride, phosphate, BOD, COD, nitrogen, metals, radioactivity, residual chlorine and chlorine demand. Polymers will also be covered. (Corequisite SCHG-276) (SCHG-271 or equivalent)
Class 3, Credit 3 (offered every year) (F)

SCHG-273 Basic Chemistry II
Registration #1011-273
A basic survey of organic chemistry and functional groups with an emphasis on addition and condensation polymers, inorganic polymers (silicates, glasses, ceramics), structure and properties of metals, and oxidation-reduction applications, including corrosion (SCHG-271; SCHG-277 is a corequisite)
Class 3, Credit 3 (offered every year) (W, S)

SCHG-276 Chemistry of Water and Waste Water Lab
Registration #1011-276
Laboratory to be taken concurrently with SCHG-272. Techniques used in water and waste water analysis will be covered. (SCHG-271 or equivalent)
Lab 3, Credit 1 (offered every year) (F)

SCHG-277 Basic Chemistry II Lab
Registration #1011-277
Experiments with organic chemistry, polymers, metals, and oxidation-reduction. (SCHG-205; SCHG-273 is a corequisite)
Lab 3, Credit 1 (offered every year) (W, S)

SCHG-281 Chemical Foundations I
Registration #1011-281
Basic concepts of general chemistry including measurement, atomic theory, chemical bonding, stoichiometry, the liquid and solid states, properties of water. (SMAM-204)
Class 3, Recitation 1, Credit 4 (offered every year) (W)

SCHG-282 Chemical Foundations II
Registration #1011-282
Basic concepts of general chemistry including solutions, colligative properties, acid-base theory, pH, titrations, oxidation-reduction, organic functional groups, addition and condensation polymers. (SCHG-281)
Class 3, Recitation 1, Credit 4 (offered every year) (S)

SCHG-289 Contemporary Science: Chemistry
Registration #1011-289
This course examines a broad range of contemporary scientific topics with a chemical basis. These may include nuclear power, sources of energy, air and water pollution, medicines and drugs in addition to the chemical laws and structure of the atom.
Class 4, Credit 4 (F, W, S)
SCHO-309  Glassblowing Techniques
Registration #1011-309
This course is designed to introduce and train each student in small-scale scientific glassblowing techniques. Proficiency will be developed in rod manipulation, ring seals, construction of apparatus, annealing, use of a simple lathe and hand-torch work. (May be taken by chemistry, polymer chemistry, and other majors.)
Class 4, Credit 2 (offered upon sufficient request)

SCHO-231,232  Organic Chemistry
Registration #1013-231,232
Survey of the structure, nomenclature, reactions, and synthesis of the major functional groups. Mechanisms of main classes of reactions are discussed. (Corequisites SCHO-235, 236) (SCHG-216 or 212, or 209)
Class 3, Credit 3 (offered every year) (231-F; 232-W)

SCHO-233  Organic Chemistry
Registration #1013-233
Structure, nomenclature, reactions, and properties of the important classes of bio-organic molecules (carbohydrates, lipids, amino acids, proteins, and nucleic acids) are covered in depth. Emphasis is on structure and reactivity in relation to biochemical processes. (Corequisite SCHO-237) (SCHO-232)
Class 3, Credit 3 (offered every year) (S)

SCHO-235, 236,237  Organic Chemistry Lab
Registration #1013-235, 236, 237
Laboratory work emphasizes techniques, preparations, and analyses. SCHO-237 emphasizes reactions and properties of biomonomers and polymers. (Corequisites SCHO-231, 232, 233)
Lab 3, Credit 1 (offered every year) (235-F; 236-W; 237-S)

SCHO-431  Organic Chemistry I
Registration #1013-431
A rigorous survey of the reactions of major organic functional groups, emphasizing alkanes, alkenes, alkyl halides, and alkynes. Stereochemistry is also included. (Corequisite SCHO-435) (SCHC-252)
Class 3, Credit 3 (offered every year) (S, SR)

SCHO-432  Organic Chemistry II
Registration #1013-432
A continued survey of reactions of major organic functional groups, including aromatic compounds, alcohols, ethers, aldehydes, and ketones. Organometallics and spectral analysis (IR, UV, NMR) are also included. (Corequisite SCHO-436) (SCHO-431)
Class 3, Credit 3 (offered every year) (F, W)

SCHO-433  Organic Chemistry III
Registration #1013-433
A continued survey of reactions of major organic functional groups, including carboxylic acids, carboxylic acid derivatives, amines, and enolate anions. Structure, nomenclature, reactions, and properties of important classes of bio-organic molecules are also included. (Corequisite SCHO-437) (SCHO-432)
Class 3, Credit 3 (offered every year) (S, SR)

SCHO-435, 436  Preparative Organic Chemistry
Registration #1013-435,436
Synthesis of organic compounds utilizing a variety of laboratory techniques. Purification techniques and spectral characterization will be routinely used. (SCHO-431 should be taken concurrently with SCHO-435, SCHO-432 with SCHO-436.) (SCHC-252 or equivalent)
Lab 6, Credit 2 (offered every year) (435-S, SR; 436-F, W)

SCHO-437  Systematic Identification of Organic Compounds
Registration #1013-437
A laboratory course utilizing synthesis, and chemical and spectral (IR, NMR, and GC/MS) techniques to identify and characterize organic compounds. (Should be taken concurrently with SCHO-433.) (SCHC-319, SCHO-432,436)
Lab 6, Credit 2 (offered every year) (S, SR)

SCHO-601  Organic Chemistry of Polymers
Registration #1013-601
The chemistry of high molecular weight organic polymers and their properties are introduced and discussed in depth. Mechanisms of step-growth and chain-growth polymerization reactions, polymer reactions and degradations are studied. (SCHO-433)
Class 4, Credit 4 (F-X*)

SCHP-301  Introduction to Polymer Technology
Introduction to the history of polymer chemistry, the terminology of polymers, the structures, methods of synthesis, and properties of commercially significant polymers, and the major polymer processing techniques. (SCHO-432 or equivalent)
Class 2, Credit 2 (offered every year) (F)

SCHP-340  Introduction to Physical Chemistry
Registration #1014-340
Properties of gases, kinetic theory of gases, energy and the First Law; thermochemistry; entropy and the Second and Third Laws; introduction to Helmholtz and Gibbs free energy, gas equilibrium. (SCHC-252, SMAM-252, SPSP-311)
Class 3, Credit 3 (offered every year) (F, W)

SCHP-441  Physical Chemistry I
Registration #1014-441
Review of the thermodynamic laws; criteria for equilibrium and spontaneity; chemical equilibrium; phase rule; equilibrium in ideal and non-ideal solutions; electrochemistry. (Should be taken concurrently with SCHP-445.) (SCHP-340)
Class 3, Credit 3 (offered every year) (S, SR-X*)

SCHP-442  Physical Chemistry II
Registration #1014-442
Introduction to quantum mechanics and spectroscopy, radioactivity; Planck's law; photoelectric effect; the Bohr atom; deBroglie, Schrodinger, and Heisenberg theories; eigenvalue/eigenfunction equations; variation and perturbation theory; quantum statics; Heitler-London theory of covalent bonds; selection rules and spectroscopy. (Should be taken concurrently with SCHP-446.) (SMAM-306, SCHP-441)
Class 3, Credit 3 (offered every year) (F, W-X*)
SCHP-443  Physical Chemistry III
Registration #1014-443
Kinetic molecular theory; transport properties of gases; chemical
kinetics; surface chemistry; photochemical kinetics; irreversible
processes in solution. (Should be taken concurrently with SCHP-
447.) (SCHP-441)
Class 3, Credit 3 (offered every year) (S-X*, SR)

SCHP-445  Physical Chemistry
Registration #1014-445  Laboratory I
Introduction to physical chemistry laboratory; chemical
thermodynamics and equilibrium. (Should be taken concurrently
with SCHP-441.)
Lab 3, Credit 1 (offered every year) (S, SR-X*)

SCHP-446  Physical Chemistry
Registration #1014-446  Laboratory II
Experiments in the application of quantum chemistry, atomic and
molecular spectroscopy, and radioactivity. (Should be taken
concurrently with SCHP-442.)
Lab 3, Credit 1 (offered every year) (F, W-X*)

SCHP-447  Physical Chemistry
Registration #1014-447  Laboratory III
Laboratory experiments in chemical dynamics. (Should be taken
concurrently with SCHP-443.)
Lab 3, Credit 1 (offered every year) (S-X*, SR)

SCHP-602  Physical Chemistry of Polymers
Registration #1014-602
Study of the theoretical and experimental aspects of polymer
characterization. In addition, theoretical considerations of the
configuration of polymer chains and statistical thermodynamics of
polymer solutions will be related to experimental results.
(SCHP-443)
Class 4, Credit 4 (offered every year) (S-X*)

SCHP-603  Structure-Property Relationships in Polymers
Registration #1014-603
An introduction to the microstructure and morphology of
amorphous and semicrystalline polymeric systems and their
influence on thermomechanical, optical, and electronic properties
of polymers. Topics include viscoelasticity and composites.
(SCHO-401 or SCHP-602)
Class 4, Credit 4 (F-X*)

SCHP-604  Characterization of High Polymers
Registration #1014-604
Experiments on dilute solution viscosity, gel permeation
chromatography, microscopy, differential scanning calorimetry,
thermogravimetric analysis, tensile testing, infrared spectroscopy,
NMR spectroscopy and other aspects of polymer characterization.
(SCHO-401 or SCHP-602)
Lab 6, Credit 2 (S)

SCHP-605  Synthesis of High Polymers
Registration #1014-605
Experiments on condensation, free radical, ring opening, and
ionic polymerizations and polymer modification. (SCHO-437)
Lab 6, Credit 2 (F)

SCHP-630  Magnetic Resonance Imaging
Registration #1014-630
This course introduces the principles of magnetic resonance
imaging (MRI) at a level understandable by both the scientist and
non-scientist. The course begins with the basics of nuclear
magnetic resonance, the foundation of MRI. Magnetic resonance
imaging techniques and instrumentation will be explained.
Emphasis will be placed on understanding the imaging process. A
discussion of information available for water proton content im-
ageas of body parts and tissue types will be presented. Future
directions of MRI will be presented. (SPSP-311, 312, 313 or
SPSP-211, 212, 213; SCHP-648)
Class 4, Credit 4 (W) (X*)

SCHP-648  Basics of Pulsed NMR
Registration #1014-648
An introduction to the principles of pulsed nuclear magnetic
resonance (NMR) spectroscopy. Lectures on instrumentation,
pulse sequences, Fourier transforms, and artifacts will be
presented. (SCHA-311)
Class 1, Credit 1 (offered every year) (F)

SCHA-711  Instrumental Analysis
Registration #1008-711
Theory, applications, and limitations of selected instrumental
methods in qualitative, quantitative, and structural analysis.
Topics covered include mass spectroscopy, nuclear magnetic
resonance, electrochemistry, surface methods and new analytical
methods. (SCHP-340, SCHO-432)
Class 3, Credit 3 (offered every year) (F, W-X*)

SCHA-720  Instrumental Analysis Lab
Registration #1008-720
Lab accompanying SCHA-711. Experiments include AA, FT-IR
and RAMAN, GC/MS, electrochemistry, and thermal analysis.
Problem solving and experimental design are emphasized.
Lab 6, Credit 2 (offered every year) (F-X*, W)

SCHB-702  Biochemistry: Biomolecular
Registration #1009-702  Conformation & Dynamics
Introduction to biological chemistry. Chemical structures,
reactions, molecular organization and physiological functions of
the molecular components of cells; amino acids, proteins,
enzymes, enzyme kinetics, co-enzymes, biochemical thermo-
dynamics, carbohydrates and lipids, membrane structure, and
function. Emphasis is on the structure-function relationships of
biomolecules, their solution behavior and dynamics. (SCHO-433,
SCHP-340 or SCHB-334)
Class 3, Credit 3 (offered every year) (F, W)

SCHB-704  Biochemistry: Nucleic Acids
Registration #1009-704  and Molecular Genetics
The biochemistry of inheritance, expression of genetic informa-
tion, protein biosynthesis. Biochemical aspects of viral and bac-
terial infection. (SCHB-702 or SCHB-334)
Class 3, Credit 3 (offered every year) (S-X*, SR)

*X, extended day (after 5 p.m.)
SCHC-772  Special Topics
Registration #1010-772
Advanced courses which are of current interest and/or logical continuations of the course already being offered. These courses are structured as ordinary courses and will have specified prerequisites, contact hours and examination procedures. Recent courses taught as Special Topics include Nuclear Chemistry, Polymer Morphology, Advanced Chromatographic Methods, and Applications of Computer Interfacing.
Class variable, Credit variable (offered every year)

SCHC-870  Chemistry Seminar
Registration #1010-870
Credit 1 (offered every year)

SCHC-877  External Research
Registration #1010-877
Industrial internship research
Credit 1-16 (offered every year)

SCHC-879-99 Continuation of Thesis
Registration #1010-879-99
Credit 0 or 1

SCHC-879  Research and Thesis Guidance
Registration #1010-879
Hours and credits to be arranged. Chemical research in a field chosen by the candidate, subject to approval of the department head and advisor.
Credit variable (offered every year)

SCHC-899  Independent Study: Chemistry
Registration #1010-899
Credit variable (offered every year)

SCHI-762  Inorganic Chemistry I: Periodicity and Reactivity
Registration #1012-762
For the common elements, mastery will be required of chemical reactions which describe: (1) their isolation, (2) their characteristic chemical reactivities, and (3) large volume industrial processes. Relationships between the reactivities of neighboring elements will be elucidated and justified according to current theories. (SCHO-433, SCHP-442)
Class 3, Credit 3 (offered every year) (S, SR-X*)

SCHI-763  Inorganic Chemistry II: Isomerism, Symmetry, and Bonding
Registration #1012-763
This course provides an in-depth view of how bonding theories endeavor to account for and predict the physical properties (e.g., color, magnetism, stability, chemical potential, electrical conductivity, and others) of a wide variety of inorganic compounds. (SCHO-433, SCHP-442)
Class 3, Credit 3 (offered every year) (F, W-X*)

SCHI-764  Inorganic Chemistry III: Physical Methods and Recent Advances
Registration #1012-764
This course introduces the student to the more sophisticated tools with which an inorganic chemist investigates inorganic materials. These physical methods with the bonding theories from SCHI-763, are applied to inorganic reactions that exemplify the similarities and anomalous behavior of the elements in each family of the periodic table. Application of this knowledge to contemporary research areas of inorganic chemistry is conducted. (SCHI-763)
Class 3, Credit 3 (offered every year) (S, SR-X*)

SCHI-765  Preparative Inorganic Chemistry
Registration #1012-765
The complexity of many inorganic "building blocks" requires a detailed understanding of inorganic theory, special handling precautions, and special methods to investigate inorganic products. Different areas of the periodic table, new synthetic methods, and new characterization techniques are examined. (Corequisite SCHI-763) (SCHI-762 or permission of instructor)
Class 1, Lab 6, Credit 3 (offered upon sufficient demand) (F, W)

SCHO-730  Chemical Toxicology
Registration #1013-730
This course provides a comprehensive introduction to the basic science of toxicology, with emphasis on a) basic principles, methods of approach and applications of toxicological data; b) types and mechanisms of toxic injury produced in major mammalian organ systems; and c) characteristics and effects of major classes of environmentally and occupationally significant toxicants. (College biology and chemistry, some biochemistry helpful, or permission of instructor)
Class 4, Credit 4 (offered upon sufficient request) (W)

SCHO-736  Spectrometric Identification of Organic Compounds
Registration #1013-736
Theory and application of proton and carbon and 2-D nuclear magnetic resonance, infrared, mass spectrometry, and ultraviolet spectra as applied to organic structure determination. (SCHO-433)
Class 4, Credit 4 (offered every year) (W)

SCHO-737  Advanced Organic Chemistry
Registration #1013-737
Several of the following advanced topics in organic chemistry are covered: polyfunctional compounds, modern synthetic methods, anion chemistry, stereospecific syntheses, protecting group chemistry, total synthesis, with strong emphasis on recent chemical literature. (SCHO-433)
Class 4, Credit 4 (offered alternate years; next offering 1993-94) (F)

SCHO-739  Advanced Organic Chemistry
Registration #1013-739
Selected topics in physical organic chemistry including: techniques for elucidation of mechanism (kinetic, linear free, energy relationships, isotope effects), molecular orbital theory, electrocyclic reactions. (SCHO-433, SCHP-443)
Class 4, Credit 4 (offered alternate years; next offering 1993-94) (S)

*X, extended day (after 5 p.m.)
Mathematics

SMAM-200
Registration #1016-200
An algebra course including such topics as operations involving polynomials, algebraic fractions, factoring, exponents and radicals, solution of linear and quadratic equations, and graphing linear equations.
Class 4, Credit 4 (F, W, S)

SMAM-204
College Algebra and Trigonometry
Registration #1016-204
Topics include a review of the fundamentals of algebra; solution of linear, fractional and quadratic equations; functions and their graphs; polynomial, exponential, logarithmic and trigonometric functions; systems of linear equations. (2 years of high school algebra)
Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-210, 211
Freshman Seminar
Registration #1016-210, 211
210: Orientation program for entering applied statistics, applied mathematics and computational mathematics majors. Several 2-3 week modules introducing students to various non-traditional areas of mathematics; brief orientation to co-op.
211: A continuation of 210 including a four-week introduction to co-op with cover letter and resume writing. Additional mathematical and statistical topics will be discussed. A technical report is required.
Class 1, Credit 1 (offered every year) (210-F; 211-W)

SMAM-214, 215
Elementary Calculus I, II
Registration #1016-214,215
214: Introduction to the study of differential calculus. The following topics will be covered: functions and graphs, limits, continuity, the derivative and its significance, the algebra of derivatives, chain rule, related rates, maxima and minima. (SMAM-204 or equivalent)
215: A continuation of SMAM-214, dealing with an introduction to integral calculus. The following topics will be covered: definite integral, area, work and distance problems, volumes, fundamental theorem of calculus, approximation techniques, exponential and logarithmic functions, applications, introduction to differential equations. (SMAM-214)
Class 3, Credit 3 (offered every year) (214-W, S; 215-S)

SMAM-220
Fundamentals of Trigonometry
Registration #1016-220
A study of the fundamental concepts in trigonometry including terminology, radian measures, trigonometric ratios, graphs of trigonometry, applications, and vectors.
Class 1, Credit 1 (offered every year) (S)

SMAM-225
Algebra for Management Science
Registration #1016-225
Introduction to functions including linear, quadratic, polynomial, exponential, logarithmic, and rational functions with applications to supply and demand, cost, revenue, and profit functions. Additional topics include matrices, linear programming, and mathematics of finance. (3 years of high school mathematics)
Class 4, Credit 4 (offered every year) (F, W, S)
SMAM-226 Calculus for Management Science
Registration #1016-226
A course stressing applications of calculus concepts to solving problems in business and economics. Topics include the limit concept; differentiation and integration of algebraic, logarithmic, exponential, and multivariate functions. (SMAM-225)
Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-228 Analytic Geometry
Registration #1016-228
A course covering topics in analytical geometry such as slopes, lines, and conic sections. Also additional topics in polar coordinates, determinants, parametric equations, trigonometry, and two- and three-dimensional vectors. (SMAM-204)
Class 4, Credit 4 (W, S)

SMAM-241, 242 Calculus and Analytic Geometry
Registration #1016-241, 242
241: A study of pre-calculus topics needed to succeed in learning calculus combined with the course material covered in SMAM-251. (3 years of high school mathematics)
242: A continuation of the material from SMAM-241 combined with the course material covered in SMAM-252. (SMAM-241 or 251)
Class 6, Credit 6 (241-F, W; 242-W)

SMAM-251,252,253 Calculus I, II, III
Registration #1016-251,252,253
A standard first course in calculus intended for students majoring in mathematics, science or engineering with the major emphasis on understanding the concepts and using them to solve a variety of physical problems. The subject matter is divided as follows:
251: Two-dimensional analytic geometry, functions, limits, continuity, the derivative and its formulas, and applications of the derivative. (3 years of high school mathematics)
252: Anti-derivatives by various methods, the definite integral with applications to calculation of area, arc length, volumes of revolution, etc., transcendental functions, numerical integration. (SMAM-251)
253: Improper integrals, formal limits of sequences, infinite series, Taylor series, polar coordinates, conic sections. (SMAM-252)
Class 4, Credit 4 (offered every year) (251-F, W, SR; 252-F, W, S, SR; 253-F, W, S, SR)

SMAM-265 Discrete Mathematics I
Registration #1016-265
An introduction to discrete mathematics with applications in computer science and mathematics with an emphasis on proof techniques. It covers the basics of combinatorics, sets, functions, the natural numbers, and the integers modulo n. (Sophomore standing)
Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-266 Discrete Mathematics II
Registration #1016-266
A continuation of discrete mathematics with applications in computer science and operations research. It covers finite state machines, relations, graphs, trees, optimization and matching. 
NOTE: The course may not be taken for credit if credit is to be earned in SMAM-467. (SMAM-265)
Class 4, Credit 4 (W, S)

SMAM-267 Introduction to Probability Models
Registration #1016-267
An introduction to discrete and continuous random variables; probability density and distribution functions; expected value and variance of random variables; and applications of probabilistic concepts to elementary queuing models. (SMAM-266 and SMAT-421 or equivalent)
Class 4, Credit 4 (W)

SMAM-289 Contemporary Science: Mathematics
Registration #1016-289
A basic survey of mathematical structures as well as an introduction to problem solving. Topics will be chosen from foundations of mathematics, algebra, topology, number theory, graph theory, probability and statistics. These structures will be examined as they occur naturally in modern settings. NOTE: Not acceptable for science credit for College of Science majors.
Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-301 Introductory Statistical Methods I
Registration #1016-301
An elementary introduction to the topics of descriptive analysis and probability. (Corequisite SMAM-311)
Class 3, Credit 3 (offered every year) (F)

SMAM-302 Introductory Statistical Methods II
Registration #1016-302
An elementary, concept-oriented introduction to the topics of inferential statistics and survey sampling methodology. Most of the calculations will be done by computer. (Corequisite SMAM-312)
Class 3, Credit 3 (offered every year) (W)

SMAM-303 Introductory Statistical Methods III
Registration #1016-303
An elementary introduction to the topics of analysis of variance, regression, and forecasting. (Corequisite SMAM-313)
Class 3, Credit 3 (offered every year) (S)

SMAM-305 Calculus IV
Registration #1016-305
A continuation of SMAM-253 treating 3-dimensional analytic geometry and vector algebra, partial derivatives, multiple integrals and applications. (SMAM-253, or may be taken concurrently)
Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-306 Differential Equations I
Registration #1016-306
This course provides an introduction to the study of ordinary differential equations and their application. Common first order equations and linear second order equations are solved. Method of undetermined coefficients, variation of parameters, linear independence and the Wronskian, numerical solution techniques of Runge Kutta, vibrating systems, Laplace transforms. (SMAM-305)
Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-307 Differential Equations II
Registration #1016-307
Second quarter course in ordinary differential equations which includes power series solution to ordinary differential equations about ordinary and regular singular points; Legendre's equations; Bessel's equations; hypergeometric equation; Picard's theorem; solution of systems of linear differential equations; phase plane analysis and stability. (SMAM-306)
Class 4, Credit 4 (offered every year) (S)
SMAM-309  Elementary Statistics I
Registration #1016-309
An introduction to elementary techniques of statistical description and inference. Topics include descriptive statistics, probability, estimation of parameters, hypothesis testing, and simple linear regression. The statistical software package MINITAB will be used to introduce students to the use of computers in statistical analysis. NOTE: This course may not be taken for credit if credit is to be earned in SMAM-314 or 319. (SMAM-204 or equivalent)
Class 4, Credit 4 (offered every year) (W, S, SR)

SMAM-311  Introductory Statistical Methods I Lab
Lab course to reinforce the concepts in the Introductory Statistical Methods I lecture course. Minitab will be used as a tool for data analysis. (Corequisite SMAM-301)
Class 2, Credit 1 (offered every year) (F)

SMAM-312  Introductory Statistical Methods II Lab
Lab course to reinforce concepts in the Introductory Statistical Methods II lecture course. SPSS will be used as a tool for data analysis. (Corequisite SMAM-302)
Class 2, Credit 1 (offered every year) (W)

SMAM-313  Introductory Statistical Methods III Lab
Lab course to reinforce the concepts in the Introductory Statistical Methods III lecture course. SPSS will be used as a tool for data analysis. (Corequisite SMAM-303)
Class 2, Credit 1 (offered every year) (S)

SMAM-314  Statistics
Basic statistical concepts for engineers and scientists covering descriptive statistics, probability, and inference. Calculus will be used where appropriate and one of the software packages, RS/1 or MINITAB, will be incorporated. NOTE: This course may not be taken for credit if credit is to be earned in SMAM-309 or 319. (SMAM-253)
Class 4, Credit 4 (offered every year) (W)

SMAM-318  Matrices and Boundary Value Problems
This course provides an introduction to matrix algebra and boundary value problems. Topics will include: matrix operations with applications to the solution of linear systems of algebraic equations, Fourier series, separation of variables, the heat equation, and the wave equation. NOTE: This course may not be taken for credit if credit is to be earned in SMAM-338. (SMAM-306)
Class 4, Credit 4 (offered every year) (S, SR)

SMAM-319  Data Analysis
This course will study the statistical principles of presenting and interpreting data. Topics covered will include: descriptive statistics and displays, random sampling, the normal distribution, confidence intervals, and hypothesis testing. The statistical software package MINITAB will be used to introduce students to the use of computers in statistical analysis. NOTE: This course may not be taken for credit if credit is to be earned in SMAM-309 or 314. (SMAM-204)
Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-321  Elementary Statistics II
Registration #1016-321
An elementary introduction to the topics of regression and analysis of variance. The statistical software package MINITAB will be used to reinforce these techniques. (SMAM-309 or SMAM-319 or SMAM-314 or equivalent)
Class 4, Credit 4 (offered upon request)

SMAM-322  Elementary Statistics III
Registration #1016-322
An elementary introduction to the topics of categorical data, non-parametrics, and control charts. The statistical software package MINITAB will be used to reinforce these techniques. (SMAM-309 or SMAM-319 or SMAM-314 or equivalent)
Class 4, Credit 4 (offered upon request)

SMAM-324  Vector Calculus
Registration #1016-324
An introduction to vector calculus. Topics include gradient, divergence, and curl; line and surface integrals; independence of path; divergence theorem; Stokes' theorem; and a discussion of applications in engineering.
Class 3, Credit 3 (offered every year) (S)

SMAM-328  Engineering Mathematics
Registration #1016-328
This course provides an introduction to matrix algebra and vector calculus. Topics include: matrix operations with applications to the solution of linear systems of algebraic equations; gradient, divergence and curl; line and surface integrals; independence of path and the divergence theorem; and Stoke's theorem with discussion of engineering applications. (SMAM-306)
Class 4, Credit 4 (offered every year) (S, SR)

SMAM-331  Matrix Algebra
Registration #1016-331
An introduction to the basic concepts of linear algebra, with an emphasis on matrix manipulation. Topics will include Gaussian elimination, matrix arithmetic, determinants, Cramer's rule, vector spaces, linear independence, basis, null and column space of a matrix, eigenvalues, and numerical linear algebra. Various applications will be interspersed throughout the course. (SMAM-306)
Class 4, Credit 4 (offered every year) (W, S)

SMAM-338  Series Solutions for Differential Equations
Registration #1016-338
The course includes: power series solutions of ordinary differential equations at ordinary and regular singular points; Fourier series and an introduction to their use in the solution of heat and wave equations. NOTE: This course may not be taken for credit if credit is to be earned in SMAM-318.
Class 4, Credit 4 (offered every year) (S)

SMAM-351  Probability and Statistics I
Registration #1016-351
Discrete and continuous probability models, random variables, probability density and distribution functions, mathematical expectation, measures of central tendency and dispersion, central limit theorem, and descriptive and inferential statistics. (SMAM-253)
Class 4, Credit 4 (offered every year) (F, W, S, SR)
SMAM-352 Probability and Statistics II
Registration #1016-352
Basic statistical concepts, sampling theory, hypothesis testing, confidence intervals, and nonparametric methods. A statistical software package will be used for data analysis. (SMAM-351)
Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-353 Applied Statistics
Registration #1016-353
Topics in simple linear regression, an introduction to analysis of variance and the use of statistical software packages. (SMAM-352)
Class 4, Credit 4, (offered every year) (W, S)

SMAM-354 Introduction to Regression Analysis
Registration #1016-354
A study of regression techniques with applications to the type of problems encountered in real-world situations. Includes extensive use of statistical software. Topics include: review of simple linear regression; multiple regression, matrix approach to regression; model evaluation, model selection procedures; various other models as time permits. (SMAM-353 and 331 or permission of instructor)
Class 4, Credit 4 (offered every year) (F, W)

SMAM-355 Design of Experiments
Registration #1016-355
A study of the design and analysis of experiments. 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; other designs and topics as time permits. (SMAM-353)
Class 4, Credit 4 (offered every year) (S)

SMAM-358 Statistical Quality Control
Registration #1016-358
A review of probability models associated with control charts, control charts for continuous and discrete data, interpretation of control charts, acceptance sampling, O.C. curves, standard sampling plans. A statistical software package will be used for data analysis. (SMAM-352)
Class 4, Credit 4 (offered every year) (S)

SMAM-365 Combinatorial Mathematics
Registration #1016-365
An introduction to the mathematical theory of combination, arrangement and enumeration of discrete structures. Topics include: enumeration, recursion, inclusion-exclusion, block design, general functions. (SMAM-265 or permission of instructor)
Class 4, Credit 4 (offered upon sufficient request)

SMAM-399 Co-op Seminar
Registration #1016-399
Exploration of cooperative education opportunities; practice in writing letters of application; resume writing; and interviewing procedures.
Class 1, Credit 0 (offered every year) (W)

SMAM-411,412 Real Variables
Registration #1016-411, 412
411: An investigation and extension of the theoretical aspects of elementary calculus. Topics include: mathematical induction, real numbers, functions, limits, continuity, differentiation, l'Hopital's rule, Taylor's theorem. (SMAM-305 and either SMAM-265 or permission of the instructor)
Class 4, Credit 4 (offered every year) (411-F, W; 412-S)

SMAM-420 Complex Variables
Registration #1016-420
Class 4, Credit 4 (offered every year) (F, W)

SMAM-432 Linear Algebra
Registration #1016-432
A further development of the basic concepts of linear algebra, including orthogonality. Topics will include similarity, linear transformations, diagonalization, inner products, Gram-Schmidt, quadratic forms, and various numerical techniques. Several applications of these ideas will also be presented. (SMAM-331)
Class 4, Credit 4 (offered every year) (F, W)

SMAM-437 Computer Methods in Applied Mathematics
Registration #1016-437
Emphasizes the formulation of problems to allow solutions by standardized techniques and library routines. A study of numerical techniques such as direct and iterative methods for solving linear and nonlinear equations and optimizing functions, discrete methods for boundary value problems, and other techniques for solving problems. Computer-based homework. (SMAM-306, 331)
Class 4, Credit 4 (offered every year) (F, W)

SMAM-451,452 Mathematical Statistics I, II
Registration #1016-451,452
451: Brief review of basic probability concepts and distribution theory; mathematical properties of distributions needed for statistical inference. (SMAM-352)
452: 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. (SMAM-451)
Class 4, Credit 4 (offered every year) (451-F, W; 452-S)

SMAM-454 Nonparametric Statistics
Registration #1016-454
This course provides 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 will be used for data analysis. (SMAM-353)
Class 4, Credit 4 (offered every year) (F, W)
SMAM-511,512 Numerical Analysis
Registration #1016-511,512
511: Numerical techniques for the solution of non-linear equations, interpolation, differentiation, integration, initial value problems. (SMAM-306, ICSA-220)
512: Continuation of 511 that treats systems of equations, eigenvalue problems, boundary value problems, splines, additional topics at the discretion of the instructor. (SMAM-511)
Class 4, Credit 4 (offered every year) (511-F, W; 512-S)

SMAM-521 Topics in Probability and Statistics
Registration #1016-521
Selected topics in applied probability and statistics to meet the needs and interest of the students. (SMAM-305, 352 or permission of instructor)
Class 4, Credit 4 (offered upon sufficient request)

SMAM-524 An Introduction to Time Series
Registration #1016-524
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 will be used for data analysis. (SMAM-353)
Class 4, Credit 4 (offered upon sufficient request)

SMAM-525 Stochastic Processes
Registration #1016-525
This course will explore Poisson processes and Markov chains with an emphasis on applications. Extensive use will be made of conditional probability and conditional expectation. Further topics, such as renewal processes, Brownian motion, queuing models and reliability will be discussed as time allows. (SMAM-331, 351, or permission of instructor)
Class 4, Credit 4 (offered upon sufficient request)

SMAM-531,532 Abstract Algebra
Registration #1016-531,532
531: A review of pertinent basic set theory and number theory. Groups, subgroups, cyclic and permutation groups, Lagrange's theorem, quotient groups, isomorphism theorems, applications to scientific problems. (SMAM-265, 432)
532: The basic theory of rings, integral domains, ideals and fields GF (pn), applications to coding theory or abstract vector spaces, function spaces, direct sums, applications to differential equations, and to scientific problems. (SMAM-531)
Class 4, Credit 4 (offered upon sufficient request)

SMAM-531,532 Abstract Algebra
Registration #1016-531,532
531: A review of pertinent basic set theory and number theory. Groups, subgroups, cyclic and permutation groups, Lagrange's theorem, quotient groups, isomorphism theorems, applications to scientific problems. (SMAM-265, 432)
532: The basic theory of rings, integral domains, ideals and fields GF (pn), applications to coding theory or abstract vector spaces, function spaces, direct sums, applications to differential equations, and to scientific problems. (SMAM-531)
Class 4, Credit 4 (offered upon sufficient request)

SMAM-551 Topics in Algebra
Registration #1016-551
Topics in abstract algebra to be chosen by the instructor either to give the student an introduction to topics not taught in SMAM-531, 532 or to explore further the theory of groups, rings or fields. (Permission of instructor)
Class 4, Credit 4 (offered upon sufficient request)

SMAM-552 Topics in Analysis
Registration #1016-552
Topics in analysis to be chosen by the instructor, either to introduce the student to topics not covered in SMAM-411, 412 or to explore further the topics covered there. (SMAM-265, 412)
Class 4, Credit 4 (offered upon sufficient request)
SMAM-555  Statistics Seminar
 Registration #1016-555
This course introduces the student to statistical situations not encountered in the previous course of study. Topics include: open-ended analysis of data, motivating use of statistical tools beyond the scope of previous courses, introduction to the statistical literature, development of statistical communication skills, and the pros and cons of statistical software packages. (SMAM-354, 355)
Class 4, Credit 4 (offered every year) (F, W)

SMAM-558  Multivariate Analysis
 Registration #1016-558
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 will be used for data analysis. (SMAM-354, 331)
Class 4, Credit 4 (offered upon request)

SMAM-559  Special Topics: Mathematics
 Registration #1016-559
Course in which topics of special interest to a sufficiently large group of students, and not covered in other courses, may be offered upon request.
Class variable, Credit variable (offered upon sufficient request)

SMAM-561,562  Complex Analysis I, II
 Registration #1016-561,562
Introduction to the theory of functions of one complex variable. Limits, continuity, differentiability; analytic functions; complex integration; Cauchy integral theorem and formula; sequences and series; Taylor and Laurent series; singularities; residues; analytic continuation; conformal mapping. A more in-depth study of analytic function theory than SMAM-420. (SMAM-411)
Class 4, Credit 4 (offered upon request)

SMAM-565  Game Theory
 Registration #1016-565
Introduction to the theory of games with solution techniques and applications. Topics include: game trees; matrix games; linear inequalities and programming; convex sets; the minimax theorem; n-person games. (SMAM-331 or permission of instructor)
Class 4, Credit 4 (offered upon request)

SMAM-566  Non-Linear Optimization Theory
 Registration #1016-566
The theory of optimization of non-linear functions of several real variables. Topics include: unconstrained optimization (Newton-Raphson, steepest ascent and gradient methods); constrained optimization (Lagrange multipliers, Kuhn-Tucker theorem, penalty concept, dynamic programming); and computational aspects (rates of convergence, computational complexity). (SMAM-305, 432)
Class 4, Credit 4 (offered upon request)

SMAM-571,572  Topology
 Registration #1016-571, 572
Metric spaces, topological spaces, separation axioms, compactness, connectedness, product spaces. (SMAM-412 or permission of instructor)
Class 4, Credit 4 (offered upon request)

SMAM-581  Introduction to Linear Models
 Registration #1016-581
Introduction to the theory of linear models. 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. (SMAM-331, 354)
Class 4, Credit 4 (offered upon sufficient request)

SMAM-599  Independent Study: Math
 Registration #1016-599
Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature and not taught in regularly offered courses.
Class variable, Credit variable (offered every year)

SMAM-620  The Fourier Transform
 Registration #1016-620
This course provides an introduction to an important mathematical tool for the analysis of linear systems. Topics covered are: a Fourier integral theorem; the Fourier transform and its inverse; an introduction to generalized functions; the Dirac delta functions; evaluating transforms; convolution, serial products; the sampling theorem; Rayleigh, power convolution, and autocorrelation theorems; the discrete Fourier transform; the fast Fourier transform. (SMAM-420)
Class 4, Credit 4 (offered upon sufficient request)

SMAT-420  Calculus for Technologists I
 Registration #1019-420
The first course in a calculus sequence covering essential concepts and manipulations. Topics include: limits, derivative, indefinite and definite integrals, and numerical approximation. Applications to physical problems are stressed. (SMAM-204)
Class 4, Credit 4 (offered every year) (F, W, S)

SMAT-421  Calculus for Technologists II
 Registration #1019-421
A continuation of SMAT-420. Topics covered in this course are applications of the integral calculus; differential and integral calculus of the transcendental functions; and basic techniques of integration with emphasis on applications to engineering problems. (SMAT-420 or equivalent)
Class 4, Credit 4 (offered every year) (F, W, S)

SMAT-422  Solutions of Engineering Problems
 Registration #1019-422
A continuation of SMAT-421. Course covers selected applied mathematics topics including: differential equations, Laplace transforms, numerical methods, and the calculus of functions of two variables. Emphasis is on the application of these topics to engineering technology problems. (SMAT-421 or equivalent)
Class 4, Credit 4 (offered every year) (F, W, S)

SMAT-423  Linear Mathematics for Technologists
 Registration #1019-423
An introduction to aspects of linear mathematics, both finite and infinite dimensional. Topics include matrices and determinants, a survey of power series, Fourier series, and Fourier transforms. (SMAT-422 or equivalent)
Class 4, Credit 4 (offered every year) (S)
Physics

SPSP-200  Physics Orientation
Registration #1017-200
An introduction to the nature and scope of physics for freshmen interested in physics as a profession. Topics include: (a) what is physics? (b) professional opportunities in physics; (c) the physics profession; (d) the literature of physics; (e) communicating in physics. Laboratory includes safety instruction; measurement and recording techniques; graphical analysis; error analysis and report writing. Each student will present a formal written or oral report on some topic of interest at the end of the course.
Class 1, Lab 2, Credit 1 (offered every year) (F)

SPSP-201,202  Physics in the Arts
Registration #1017-201,202
A study of topics from the world of art in which the underlying physical laws have influenced the art form and its development. A weekly laboratory will allow study of the relation of an art form to basic optical, mechanical, and electrical physics and in addition will provide time for development of student projects. NOTE: Not acceptable for science credit for College of Science majors.
Class 2, Lab 2, Credit 3 (offered upon sufficient request) (W, S)

SPSP-211  College Physics I
Registration #1017-211
An elementary course in college physics. Mechanics: Newton's laws of motion, momentum, rotational motion, energy, (Competency in algebra, geometry, and trigonometry) (See SPSP-271 for lab)
Class 3, Credit 3 (offered every year) (F, W)

SPSP-212  College Physics II
Registration #1017-212
Heat and thermodynamics, fluids, wave motion, sound. (SPSP-211) (See SPSP-272 for lab)
Class 3, Credit 3 (offered every year) (W, S)

SPSP-213  College Physics III
Registration #1017-213
Geometrical and wave optics, electricity and circuits, magnetism, some elements of modern physics. (SPSP-211) (SPSP-212 is highly recommended) (See SPSP-273 for lab)
Class 3, Credit 3 (offered every year) (F, S)

SPSP-271  College Physics Lab I
Registration #1017-271
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-211)
Lab 2, Credit 1 (offered every year) (F, W)

SPSP-272  College Physics Lab II
Registration #1017-272
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-212) (SPSP-271)
Lab 2, Credit 1 (offered every year) (S, W)

SPSP-273  College Physics Lab III
Registration #1017-273
This laboratory course includes experiments related to the principles and theories discussed in corresponding lectures. (Credit or coregistration in SPSP-213) (SPSP-271)
Lab 2, Credit 1 (offered every year) (F, S)

SPSP-289  Contemporary Science: Stellar Astronomy
Registration #1017-289
An introduction to the basic concepts of stellar astronomy such as celestial sphere, physical properties of the stars, principles of spectroscopy as applied to astronomy, double stars, variable stars, star clusters, stellar evolution, gaseous nebulae, stellar motions and distribution, Milky Way system, external galaxies, cosmology. (Algebra) Note: Not available for science credit for College of Science majors.
Class 4, Credit 4 (F, S, odd academic years; W, even academic years)

SPSP-300  Introduction to Semiconductor Device Physics
Registration #1017-300
An introductory survey, using some calculus, of the physics underlying operation and manufacture of modern semiconductor devices used in integrated circuits and microcomputers. Review of classical physics, classical free-electron gas, atomic physics, molecular bonds and band theory, theory of metals, structure and properties of semiconductors and semiconductor devices. (SPSP-212, 213, 273; SMAT-422)
Class 4, Credit 4 (W, odd academic years; F, S even academic years)
SPSP-312  University Physics II
Registration #1017-312
Fluids and elastic properties, heat and thermodynamics, wave motion, sound, geometrical and physical optics. (Credit or coregistration SMAM-253) (SPSP-311) (See SPSP-372 for three-hour lab, SPSP-376 for two-hour lab) 
Class 4, Credit 4 (offered every year) (F, W, S)

SPSP-313  University Physics III
Registration #1017-313
 Electrostatics, Gauss' law, electric field and potential, dielectrics, dc circuits, magnetic fields, Ampere's law, Faraday's law, inductance and capacitance, magnetism in matter, ac series circuits. (Coregistration or credit in SMAM-253) (SPSP-311, 312) (See SPSP-373 for three-hour lab, SPSP-377 for two-hour lab) 
Class 4, Credit 4 (offered every year) (F, W, S)

SPSP-314  Introduction to Modern Physics
Registration #1017-314
An introductory survey of modern physics at the sophomore level. Fundamentals of relativity, photons, interaction of radiation with matter, deBroglie waves, Bohr model, introduction to quantum mechanics, nuclear systematics, radioactivity, alpha, beta, and gamma decays, Q-values, nuclear fission, nuclear fusion. (SMAM-305; SPSP-312, 313) 
Class 4, Credit 4 (offered every year) (F, W, S)

SPSP-315  Introduction to Semiconductor Physics
Registration #1017-315
Kinetic theory of gases and transport phenomena; Drude's theory of metals; quantum mechanics of a particle in a box; atomic orbitals; band theory of metals, insulators, and impurity semiconductors; Fermi-Dirac distribution; equilibrium charge-carrier densities in metals, insulators, and semiconductors; operation principles of diodes, bipolar junction transistors, and MOSFETs. (SMAM-306, SPSP-314) 
Class 4, Credit 4 (offered every year) (W, S)

SPSP-317  Introduction to Computational Physics
Registration #1017-317
An introduction to techniques of computational physics including: numerical differentiation, integration, solutions of the equations of Newtonian mechanics, and error propagation. FORTRAN programming including: type, conditional, and format statements; loops, subtyped variables, intrinsic functions, subprograms, reading from and writing to files. Introduction to the mainframe (VAX) environment. (Credit or coregistration in SPSP-312 and SMAM-252) 
Class 4, Credit 4 (S)

SPSP-319  Electrical Processes in Solids
Registration #1017-319
Introduction to statistical mechanics; Planck's formula; transport equation; electronic properties of conductors and semiconductors; characteristics of metal-metal, metal-semiconductor, and pn junctions; operating principles of solid state devices; theory and application. (SPSP-315) 
Class 4, Credit 4 (offered upon sufficient request) (S)

SPSP-321  Introduction to Laboratory Techniques
Registration #1017-321
An introduction to equipment and procedures common to the physics research laboratory. The oscilloscope and ac circuit analysis, statistics, vacuum systems including vacuum pumps and gauges, the laboratory notebook, and writing for publication. (SPSP-312, 313, 372, 373) 
Class 3, Lab 3, Credit 4 (offered every year) (F, transfer students only; W)

SPSP-331  Introduction to Electricity and Electronics
Registration #1017-331
Fundamentals of electricity; construction and measurements of electrical and electronic circuits encountered in a scientific laboratory. (Two quarters of college-level physics) 
Class 3, Lab 3, Credit 4 (offered upon sufficient request) (S)

SPSP-341  Foundations of Scientific Thinking
Registration #1017-341
Definition of science; historical perspective; ingredients of the scientific quest; the scientific method; scientific explanation, laws, theories, and hypotheses; the role of mathematics; probability and induction; science and other disciplines. (At least a year of basic sciences at the college level) 
Class 2, Credit 2 (offered upon sufficient request) (F, W)

SPSP-350  Sophomore Physics Seminar
Registration #1017-350
A study of concepts that unify the diverse topics covered in the introductory physics sequence. Preparation for Comprehensive Oral Exam I. Techniques of physics literature searches and the preparation and organization of technical papers. (SPSP-311, 312, 313, 314) 
Class 2, Credit 1 (offered every year) (S)

SPSP-351  Radiation Physics I
Registration #1017-351
Introductory modern physics emphasizing radiation phenomena. Atomic physics, nuclear physics, radioactivity, production of radionuclides, interaction of charged particles and neutrons with matter. (SPSP-213; competency in algebra, geometry, and trigonometry; SMAM-309 recommended) 
Class 4, Lab 3, Credit 5 (offered every year) (F)

SPSP-352  Radiation Physics II
Registration #1017-352
Interaction of x-rays and gamma-rays with matter. Radiation detectors; scintillation detectors, solid state detectors. Radionuclide imaging instrumentation. (SPSP-351) 
Class 4, Lab 3, Credit 5 (offered every year) (W)

SPSP-353  Radiation Physics III
Registration #1017-353
Principles of radiation protection. Radiation protection instrumentation. Internal and external dose calculations. Practical radiation health physics. Introduction to electronics, including laboratory. (SPSP-352) 
Class 4, Lab 3, Credit 5 (offered every year) (S)
SPSP-355 Radiation Protection
Registration #1017-355
Principles and practical aspects of radiation protection; calculation of external and internal radiation dose measurements. (Permission of instructor and one year of college-level physics)
Class 3, Credit 3 (offered every year) (S)

SPSP-358 Nuclear Medicine Physics and Instrumentation
Registration #1017-358
An introduction to radiation, radioactive materials, and radiation detection to provide students with the background for understanding and working with radiation and radioactive materials. Principles of radiation detection systems and clinical uses are presented.
Class 5, Lab 3, Credit 6 (SR)

SPSP-361 Ultrasonic Physics
Registration #1017-361
A course in the basic physics of ultrasound, covering ultrasonic wave generation and propagation, transducers, Doppler effect, reflection and refraction, biological effects, and applications of ultrasonic physics in medicine. (Permission of instructor and one year of college-level physics)
Class 4, Lab 3, Credit 5 (offered every year) (F)

SPSP-371 University Physics Lab I
Registration #1017-371
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-311) (See SPSP-375 for a 2-hour lab)
Lab 3, Credit 1 (offered every year) (W)

SPSP-372 University Physics Lab II
Registration #1017-372
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-312) (SPSP-371) (See SPSP-376 for a 2-hour lab)
Lab 3, Credit 1 (offered every year) (S)

SPSP-373 University Physics Lab III
Registration #1017-373
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-313) (SPSP-371, 372) (See SPSP-377 for a 2-hour lab)
Lab 3, Credit 1 (offered every year) (F)

SPSP-374 Modern Physics Laboratory
Registration #1017-374
Basic experiments representative of the experimental foundations of modern quantum physics, such as: photoelectric effect; Franck-Hertz experiment; X-ray diffraction; optical diffraction and interference; atomic spectroscopy; electron microscopy; nuclear spectroscopy; radioactive half-life; Millikan oil drop; black-body radiation. Students enrolled in SPSP-315 may include experiments in semiconductor solid state physics. (SPSP-314, SPSP-321)
Lab 3, Credit 1 (offered every year) (S)

SPSP-375 University Physics Lab I
Registration #1017-375
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-311) (This course recommended for all students in the University Physics lectures who are not required to take a 3-hr. lab)
Lab 2, Credit 1 (offered every year) (F, W, S)

SPSP-376 University Physics Lab II
Registration #1017-376
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-312) (SPSP-375 or 371) (This course recommended for all students in the University Physics lectures who are not required to take a 3-hr. lab)
Lab 2, Credit 1 (offered every year) (F, W, S)

SPSP-377 University Physics Lab III
Registration #1017-377
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-313) (SPSP-375 or 371, SPSP-376 or 372) (This course recommended for all students in the University Physics lectures who are not required to take a 3-hr. lab)
Lab 2, Credit 1 (offered every year) (F, W, S)

SPSP-401, 402 Intermediate Mechanics I, II
Registration #1017-401, 402
401: Particle dynamics in one, two, and three dimensions; systems of particles; conservation laws; rigid body motion; gravitational fields; and potentials. (Credit or coregistration in SPSP-480) (SMAM-306, SPSP-312, 313)
402: Translating and rotating coordinate systems, mechanics of continuous media, wave motion, Lagrangian formulation of mechanics. (Credit or coregistration in SPSP-481) (SPSP-401,480)
Class 4, Credit 4 (offered every year) (401-F; 402-S)

SPSP-411,412 Electricity and Magnetism I, II
Registration #1017-411,412
Electric and magnetic fields using vector methods, Gauss' law, theory of dielectrics, Ampere's law and Faraday's law, vector potential, displacement current, Maxwell's equations, wave propagation in dielectrics and conductors; production and propagation of radiation. (SMAM-306; SPSP-312, 313, 480, 481)
Class 4, Credit 4 (offered every year) (411-F, 412-S)

SPSP-415 Thermal Physics
Registration #1017-415
Introduction to the principles of classical thermodynamics and kinetic theory. Equations of state, the First and Second Laws of Thermodynamics, entropy, thermodynamic potentials, applications of thermodynamics, and kinetic theory of gases. (SMAM-306; SPSP-312, 313)
Class 4, Credit 4 (offered every year) (F)
SPSP-421,422 Experimental Physics
Registration #1017-421,422
The elements of advanced laboratory work, including the import ance of detailed experiment planning, are presented. The requirement of effective communication of results is also an integral part of the course. Experiments are chosen from any area of physics compatible with department facilities: optics, thin films, cryogenics, semiconductors, acoustics, nuclear, etc. (SPSP-314, 321, 431 plus coregistration or credit in any one of these: SPSP-401,411,415,455)
Class 1, Lab 5, credit 3 (offered every year) (421-F; 422-S)

SPSP-431 Electronic Measurements
Registration #1017-431
Laboratory course in electronic measurements and instrumentation, with theory and applications of discrete and integrated circuits in analog and digital electronics. (SPSP-313, 321)
Class 3, Lab 3, Credit 4 (offered every year) (S)

SPSP-432 Computer Interfacing to Laboratory Instrumentation
Registration #1017-432
An introduction to microcomputer interfacing with associated laboratory exercises. Emphasis on the interface circuits using an 8088 based microprocessor. Covers elementary logic circuits, computer architecture, assembly language programming, serial and parallel interfaces, A/D and D/A conversion, RS-232C, IEEE488, and other industry standards. (SPSP-331 or 431 or equivalent)
Class 3, Lab 3, Credit 4 (offered upon sufficient request) (F)

SPSP-435 Introduction to Chaotic Dynamics of Physical Systems
Registration #1017-435
Basic concepts for visualizing the behavior of non-linear physical systems. Use of the computer as an exploratory tool for generating and observing transitions between periodic and chaotic behavior. The driven, damped pendulum as a model dynamical system for exploring such concepts as sensitivity to initial conditions, routes to chaos, strange attractors, and fractal basin boundaries. Students are asked to extend general ideas to a specific physical system by performing a term project. (SPSP-317,401)
Class 4, Credit 4 (offered upon sufficient request) (F or S)

SPSP-440 Astrophysics
Registration #1017-440
A survey of basic concepts of the astrophysics of stars and stellar systems. Observed characteristics of stars, stellar atmospheres, stellar structure, stellar evolution, interstellar medium, Milky Way, and external galaxies. (SPSP-314, SMAM-252)
Class 4, Credit 4 (offered upon sufficient request) (F or S)

SPSP-455 Optical Physics
Registration #1017-455
Physical optics including interference, diffraction, and polarization. Brief introduction to modern optics. (SMAM-305; SPSP-312,313,480)
Class 4, Credit 4 (offered every year) (F)

SPSP-480,481 Theoretical Physics I, II
Registration #1017-480, 481
480: An introduction to mathematical topics necessary for a quantitative study of physical phenomena. Topics include: vector analysis, including vector differentiation and integration, curvilinear coordinate systems and transformations from one orthogonal coordinate system to another, Fourier series and integral transforms. Applications of these concepts to physics are presented. (SMAM-306, SPSP-312, 313)
481: Application of advanced mathematical methods to physics. Topics include: the solution of several ordinary differential equations and partial differential equations encountered in physics; examples taken from heat flow, diffusion, wave phenomena, electrostatics, and modern physics. (SPSP-480)
Class 4, Credit 4 (offered every year) (480-F; 481-S)

SPSP-517 Advanced Experimental Physics
Registration #1017-517
Advanced laboratory experiments and projects in atomic physics, nuclear physics, or solid state physics. Special emphasis on experimental research techniques. (SPSP-412, 421 )
Lab 6, Credit 2 (offered every year) (F)

SPSP-522 Introduction to Quantum Mechanics
Registration #1017-522
A study of the concepts and mathematical structure of non-relativistic quantum mechanics. Exact and approximate techniques for solving the Schrodinger equation are presented for various systems. (SPSP-315,402, 412, 455, 480,481)
Class 4, Credit 4 (offered every year) (S)

SPSP-531 Solid State Physics
Registration #1017-531
The structure of solids and their thermal, mechanical, electrical and magnetic properties. (SPSP-315, 415, 480, 481 and 522)
Class 4, Credit 4 (offered every year) (F)

SPSP-540 Astronomical Instrumentation and Techniques
Registration #1017-540
A survey of modern instrumentation and techniques used in astronomical data acquisition. Topics include astronomical sources, observational limits, telescopes, atmospheric effects, spectrographs, dilute apertures, and detectors. (SPSP-455 or PIMG-362 and permission of instructor)
Class 3, Credit 3 (offered upon sufficient request) (F or S)

SPSP-541,542,543 Physics Research
Registration #1017-541,542,543
Faculty-directed student project or research usually involving laboratory work or theoretical calculations that could be considered of an original nature. (Permission of the instructor)
Class variable, Credit variable (offered every year)

SPSP-550, 551 Senior Physics Seminar
Registration #1017-550, 551
A study of concepts that unify the diverse topics covered in the intermediate and advanced physics courses. Preparation for Comprehensive Oral Exam II. Preparation and organization of technical papers as well as the oral and poster presentation of such papers. (SPSP-402, 412, 415, 455, 522)
Class 2, Credit 1 (offered every year) (F)
SPSP-553  
**Nuclear Physics**  
Registration #1017-553  
A study of the structure of the atomic nucleus as determined by experiments and theory. Description and quantum mechanical analysis of nuclear properties, radioactivity, and nuclear reactions. (SPSP-522)  
Class 4, Credit 4 (offered on sufficient request) (F)  

SPSP-559  
**Special Topics: Physics**  
Registration #1017-559  
Advanced courses which are of current interest and/or logical continuations of the courses already being offered. These courses are structured as ordinary courses and have specific prerequisites, contact hours and examination procedures. Topics could include: introductory statistical mechanics; plasma physics; general relativity; linear integrated circuits; cryogenics; radio astronomy; history of physics; astrophysics; astronomy.  
Class variable, Credit variable (offered upon sufficient request)  

SPSP-599  
**Independent Study: Physics**  
Registration #1017-599  
Faculty-directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature.  
Class variable, Credit variable (offered every year)  

**General Science**  

SSEG-621  
**Building Scientific Apparatus**  
Registration #1018-621  
L Laboratory  
Basic skills associated with the construction of scientific laboratory apparatus, some of which is not commercially available, will be covered: machine shop skills, working with glass, vacuum line technology, optical spectrometer design, and instrument electronics. (Corequisite SCHA-620) (SCHP-441; SPSP-212, 213 or 312, 313; or permission of instructor)  
Lab 4, Credit 1 (offered upon sufficient request)  

**Allied Health Sciences**  

SCLG-205  
**Introduction to Diagnostic Medical Imaging**  
Registration #1026-205  
An entry-level exploration of the historical, professional and occupational development of medical imaging. Current uses and future trends will be discussed in the areas of radiography, computed tomography, magnetic resonance, nuclear medicine, and ultrasound imaging.  
Class 2, Credit 2 (F, S)  

SCLG-203  
**Allied Health Freshman Seminar**  
Registration #1026-203  
Basic skills, techniques, and instruction for incoming students to develop strategies for a successful RIT experience. Topics include diversity, study skills, community service, and self-discovery and awareness.  
Class 1, Credit 1 (F)  

SCLG-289  
**Contemporary Science: Health Sciences**  
Registration #1026-289  
This course will examine areas within the health field, including evolutionary structural development and future projects, with emphasis on methods of diagnostic testing, selected disease conditions, the utilization of computers, and current topics in health care. Course content emphasis varies each quarter.  
Class 4, Credit 4 (F, W, S)  

SCLG-301  
**Medical Terminology**  
Registration #1026-301  
Emphasizes etymology, definition, pronunciation and correct utilization of medical terms, which enables students to develop a vocabulary essential to the understanding of and communication with the various health areas in which allied health professionals will serve.  
Class 3, Credit 3 (offered every year) (F, S)  

SCLG-415  
**Pathophysiology**  
Registration #1026-415  
This course combines knowledge of human physiology with disease processes. The etiology, pathological mechanisms, characteristic symptoms, clinical manifestations, diagnostic and therapeutic procedures of common diseases will be covered. Topics include cellular and tissue response to pathogenic agents, neoplasia, developmental disorders, disorders of body systems, and disease of major organs. (SBIB-306)  
Credit 4 (S)  

SCLG-559  
**Special Topics**  
Registration #1026-559  
Clinical Sciences  
Advanced courses which are of current interest and/or logical continuations of the courses already being offered. These courses are structured as ordinary courses and have specified prerequisites, contact hours and examination procedures.  
Class variable, Credit variable (F, W, S)  

SCLG-599  
**Independent Study:**  
Registration #1026-599  
Clinical Sciences  
Faculty directed study of appropriate topics on a tutorial basis. This course will be used to enable an individual to pursue studies of existing knowledge available in the literature.  
Class variable, Credit variable (F, W, S)  

SCLB-201  
**Introduction to Biomedical Computing**  
Registration #1027-201  
An introduction to the applications of computers in health care. Information concerning career opportunities and cooperative education will be provided.  
Class 1, Credit 1 (F)  

SCLB-305  
**MUMPS Programming Language**  
Registration #1027-305  
An in-depth study of the MUMPS programming language and its data base capabilities. Programming projects will be required and will be taken from the health care field. Direct mode, local/global/special variables, commands, arguments, operators, writing and executing routines, MUMPS editors, screen/printer formatting, string manipulation, pattern matching, concatenation, globals and arrays (trees), multilevel and string subscripts, input/output using devices, cross reference files, indirection. (ICSP-241, 242)  
Class 4, Credit 4 (S)
SCLM-210  Medical Technology Seminar  
Registration #1024-210  
This course is designed to introduce the student to the profession of medical technology through a series of lectures which provide an overview of the major departments within the modern clinical laboratory. Historical perspectives, development aspects, and regulating standards of the medical technology profession will be discussed.  
Class 1, Credit 1 (F)

SCLM-401  Hematology/Immunohematology  
Registration #1024-401  
A study of the blood (erythrocytes, leukocytes, platelets, coagulation factors and blood group antigens). Descriptions of the cellular components of the blood in health and in disease. Cellular and immunological functions and their interrelationships. Hemostasis and coagulation mechanisms. Structures of antigens and antibodies and mechanisms of antigen-antibody reactions. Lab procedures demonstrate cell counting techniques, coagulation studies, antigen-antibody reactions and compatibility testing of various blood groups. (SBIB-306 or permission of instructor)  
Class 3, Lab 3, Credit 4 (S)

SCLM-405  Diagnostic Bacteriology and Mycology  
Registration #1024-405  
Study of bacteria and fungi that cause human disease. Lecture and laboratory subjects include microorganisms growth, isolation, identification, antibiotic sensitivity, and related human immunological and serological responses. (SBIB-404)  
Class 3, Lab 3, Credit 4 (W)

SCLM-406  Virology  
Registration #1024-406  
Molecular biology, chemistry, epidemiology and clinical aspects of viruses; morphology, genetics, immunology, environmental effects; methods of isolation, cultivation, identification; assays. Human virus diseases. (One year of general biology)  
Class 4, Credit 4 (offered upon sufficient request)

SCLM-412  Parasitology  
Registration #1024-412  
Class 3, Lab 3, Credit 4 (offered upon sufficient request)

SCLM-432  Clinical Laboratory Instrumentation  
Registration #1024-432  
Principles of clinical laboratory instruments in the analysis of body fluids. This quarter stresses the principles of instrumental methods of analysis including visible and ultraviolet spectrophotometry, nephelometry, fluorometry, flame photometry, refractometry, chromatography, electrophoresis, osmometry, radiation counters, and automated chemical analyzers. (SCHG-217 or equivalent, SBIB-306)  
Class 2, Lab 6, Credit 4 (F, W)

SCLM-433  Basic Clinical Chemistry  
Registration #1024-433  
Principles of clinical chemistry in the analysis of the chemical component of body fluids. This quarter stresses the basic chemistries underlying the classical methodologies and relates them to the disease state. Topics include: liver function tests, renal function tests, carbohydrates, electrolytes, acid base balance, enzymes, lipids, endocrine function tests, drug analysis and statistical quality control. (SCHG-217 or equivalent, SBIB-306)  
Class 2, Lab 6, Credit 4 (S)

SCLN-301  Clinical Aspects of MRI  
Registration #1025-301  
Principles of clinical magnetic resonance imaging in different organ systems. Lectures stress system operation, instrumentation, and protocols for imaging, applying basic MRI principles. Topics include: image quality and contrast, pulse sequences, clinical applications, and management of a MR center.  
Credit 3 (S)

SCLN-310  Radiation and the Human Body  
Registration #1025-310  
This course details qualitative and quantitative effects on the human body of exposure to various amounts and types of ionizing radiation and the benefits of the medical uses of radiation. It presents a rationale for the safe handling and use of radioactive materials.  
Class 2, Credit 2 (SR)

SCLN-401  Introduction to Clinical Nuclear Medicine  
Registration #1025-401  
A combination lecture/laboratory course introducing clinical aspects of nuclear medicine. Hospital organization is presented as well as the relationship of nuclear medicine services to other hospital services. Laboratories in affiliated hospitals are correlated with lectures on nuclear medicine technology, patient care and emergency procedures. (Fourth-year standing in NMT program)  
Credit 4 (F)

SCLN-402  Nuclear Medicine Procedures  
Registration #1025-402  
Central Nervous System  
A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the central nervous system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)  
Credit 1 (F)

SCLN-502  Nuclear Medicine Procedures  
Registration #1025-502  
Skeletal System  
A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the skeletal system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)  
Credit 1 (F)
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<td>Nuclear Medicine Procedures</td>
<td>#1025-503</td>
<td>A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the respiratory system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)</td>
<td>1 (F)</td>
<td></td>
</tr>
<tr>
<td>SCLN-510</td>
<td>Nuclear Medicine Procedures</td>
<td>#1025-510</td>
<td>A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the urinary system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)</td>
<td>2 (W)</td>
<td></td>
</tr>
<tr>
<td>SCLN-511</td>
<td>Nuclear Medicine Procedures</td>
<td>#1025-511</td>
<td>A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the endocrine system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)</td>
<td>2 (W)</td>
<td></td>
</tr>
<tr>
<td>SCLN-512</td>
<td>Nuclear Medicine Procedures</td>
<td>#1025-512</td>
<td>A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the cardiovascular system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)</td>
<td>2 (W)</td>
<td></td>
</tr>
<tr>
<td>SCLN-513</td>
<td>Nuclear Medicine Procedures</td>
<td>#1025-513</td>
<td>A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the digestive system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)</td>
<td>2 (S)</td>
<td></td>
</tr>
<tr>
<td>SCLN-514</td>
<td>Nuclear Medicine Procedures</td>
<td>#1025-514</td>
<td>A combination lecture/practicum course. Lectures are given on specific imaging procedures involving special studies. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)</td>
<td>1 (S)</td>
<td></td>
</tr>
<tr>
<td>SCLN-515</td>
<td>Nuclear Medicine Procedures</td>
<td>#1025-515</td>
<td>A combination lecture/practicum course covering the various nuclear imaging procedures involving structures in the respiratory system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)</td>
<td>1 (S)</td>
<td></td>
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<tr>
<td>SCLN-516</td>
<td>Instrumentation and Radiochemistry and Radioassay</td>
<td>#1025-516</td>
<td>A combination lecture/lab course covering the production and use of radioisotopes in medicine. Radioassay is performed, and quality control procedures, dose calibration, and quality control are covered. (Fourth-year standing in NMT program)</td>
<td>2 (W)</td>
<td></td>
</tr>
<tr>
<td>SCLN-517</td>
<td>Radiation Health Safety</td>
<td>#1025-517</td>
<td>A study of the application of radionuclides in the treatment of disease and the study of the biological changes which occur following irradiation. (Fourth-year standing in NMT program)</td>
<td>1 (W)</td>
<td></td>
</tr>
<tr>
<td>SCLN-518</td>
<td>Radionuclide Therapy</td>
<td>#1025-518</td>
<td>A study of the application of radionuclides in the treatment of disease and the study of the biological changes which occur following irradiation. (Fourth-year standing in NMT program)</td>
<td>1 (W)</td>
<td></td>
</tr>
<tr>
<td>SCLN-519</td>
<td>Radiation Health Safety</td>
<td>#1025-519</td>
<td>A study of the application of radionuclides in the treatment of disease and the study of the biological changes which occur following irradiation. (Fourth-year standing in NMT program)</td>
<td>2 (S)</td>
<td></td>
</tr>
<tr>
<td>SCLN-520</td>
<td>Radioassay</td>
<td>#1025-520</td>
<td>A combination lecture/lab course covering the production and use of radioisotopes in medicine. Radioassay is performed, and quality control procedures, dose calibration, and licensing are covered. (Fourth-year standing in NMT program)</td>
<td>4 (S)</td>
<td></td>
</tr>
<tr>
<td>SCLN-521</td>
<td>Review in Nuclear Medicine</td>
<td>#1025-521</td>
<td>Discussion of all aspects of nuclear medicine covered during the clinical internship including preparation for the national certification exams in nuclear medicine technology. (Fourth-year standing in NMT program)</td>
<td>2 (S)</td>
<td></td>
</tr>
</tbody>
</table>
SCLN-522: Clinical Nuclear Medicine I
Registration #1025-522
A clinical practicum which gives the student the opportunity to learn and master nuclear medicine procedures through technical and practical experience. Each student is assigned a particular combination of three hospitals and trains approximately three months in each. Students work with patients under the supervision of physicians and technologists on the hospital staff. Student progress and performance is monitored by the RIT nuclear medicine technology clinical coordinator who makes periodic visits to the hospital department. (Fourth-year standing in NMT program)
Credit 7 (F)

SCLN-523: Clinical Nuclear Medicine II
Registration #1025-523
Continuation of Clinical Nuclear Medicine I. (Fourth-year standing in NMT program)
Credit 7 (W)

SCLN-524: Clinical Nuclear Medicine III
Registration #1025-524
Continuation of Clinical Nuclear Medicine II. (Fourth-year standing in NMT program)
Credit 7 (S)

SCLS-412: Cross-Sectional Anatomy
Registration #1030-412
Basic cross-sectional anatomy of the head, neck, abdomen, and pelvis. Builds on the basic knowledge of anatomy. 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. (SBIB-305, 306 or permission of instructor)
Class 4, Credit 4 (W)

SCLS-413: Ultrasound Instrumentation
Registration #1030-413
Principles of ultrasound physics are directly applied to the use of ultrasound instrumentation in medical imaging. Transducers, signal production, data display, manipulation of controls, quality control, biologic effects, and doppler will be discussed. Emphasis will be on the creation of high quality images on laboratory scanners.
Class 4, Credit 4 (S)

SCLS-414: General Vascular Examination
Registration #1030-414
A course designed to give basic knowledge of general vascular evaluation with an emphasis on the sonographic approach. Two-dimensional real-time imaging and Doppler techniques will be presented as well as a discussion of other imaging modalities and their use in vascular evaluation. Performance of examinations on laboratory equipment will be stressed. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of faculty)
Class 2, Credit 2 (F, W, S) Class 3, Credit 3 (W)

SCLS-552: Introduction to Obstetrical Ultrasound
Registration #1030-552
Provides the ultrasound candidate with basic knowledge necessary to perform obstetrical examinations. High quality image production, recognition of normal structures and basic pathologic states will be stressed. Examination protocols, review of specific anatomy, film reading, and use of other imaging techniques will be addressed. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of faculty)
Class 3, Credit 3 (F)

SCLS-553: Gynecologic Ultrasound
Registration #1030-553
Information necessary to perform basic gynecologic sonographic examinations is presented. Examination strategies for various procedures will be explored, as well as the integration of ultrasound into established clinical practices. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of faculty)
Class 3, Credit 3 (F)

SCLS-554: Advanced Obstetrical Ultrasound
Registration #1030-554
Provides information necessary to perform more sophisticated obstetrical procedures utilizing ultrasound. Examination strategies for various procedures will be explored as well as the integration of ultrasound into established clinical practices. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of faculty)
Class 4, Credit 4 (W)

SCLS-556: Abdominal Ultrasound I
Registration #1030-556
Laboratory simulation and classroom instruction are used to develop practical skills and clinical knowledge necessary to perform basic abdominal examinations utilizing ultrasound. High quality image production, recognition of normal abdominal structures and basic pathologic states will be stressed. Examination protocols, review of anatomy, film reading, and use of other scanning techniques will be addressed. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of faculty)
Class 3, Credit 3 (F)

SCLS-557: Abdominal Ultrasound II
Registration #1030-557
A continuation of SCLS-556. Laboratory simulation and classroom instruction are used to develop practical skills and clinical knowledge necessary to perform basic abdominal examinations utilizing ultrasound. High quality image production, recognition of normal abdominal structures and basic pathologic states will be stressed. Examination protocols, review of anatomy, film reading, and use of other scanning techniques will be addressed. This is an internship course. (Fourth-year standing in the Ultrasound Program or permission of faculty)
Class 3, Credit 3 (F)
SCLS-558  
**Small Parts Ultrasound**  
Registration #1030-558  
This course provides the classroom and clinical knowledge necessary to perform basic sonographic examination of anatomy classified as small parts, usually utilizing specialized equipment and high megahertz frequencies. Examination strategies for various procedures will be discussed, as well as the role of ultrasound in established clinical practices utilizing small parts imaging. This is an internship course. (Fourth-year standing in the Ultrasound Program or permission of faculty)  
Credit 7 (S)

SCLS-560  
**Seminar in Ultrasound I**  
Registration #1030-560  
Speaking, writing, and researching skills are explored. This course presents methods of basic research, developing writing strategies, and oral presentations. Students develop or critique a research project and prepare a written document following common publishing guidelines in addition to making oral presentations. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of faculty)  
Class 2, Credit 2 (W)

SCLS-561  
**Seminar in Ultrasound II**  
Registration #1030-561  
Candidates will 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 will work together to develop the physical, administrative, and financial aspects of a department. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of faculty)  
Class 2, Credit 2 (S)

SCLS-570  
**Clinical Ultrasound**  
Registration #1030-570  
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 both the laboratory and clinical settings will be stressed. Nursing procedures and medico-legal considerations will also be discussed as related to the practice of ultrasound examination. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of faculty)  
Credit 7 (F)

SCLS-571  
**Clinical Ultrasound II**  
Registration #1030-571  
Further prepares the candidate for application of classroom knowledge to the practice of ultrasound by means of a clinical internship. Performing basic, general ultrasound examinations in both the laboratory and clinical settings will be stressed. The candidate will be expected to perform basic examinations with little, if any, assistance by the end of this course. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of director; SCLS-570)  
Credit 7 (W)

SCLS-572  
**Clinical Ultrasound III**  
Registration #1030-572  
Final development of ultrasound examination skills by means of clinical internship. The candidate will be expected to perform general ultrasound examinations with no assistance by the end of this course. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of director; SCLS-571)  
Credit 7 (S)

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**Clinical Chemistry**

SCLS-705  
**Mechanisms of Disease**  
Registration #1023-705  
Following a brief review of normal physiology, this course will cover such topics as: mechanisms of cellular injury, the healing process, atherosclerotic heart disease, hypertension, infectious disease, and many other important medical topics.  
Class 4, Credit 4 (W)

SCLS-712  
**Statistics and Quality Control**  
Registration #1023-712  
The principles of statistics as applied to biomedical research as well as clinical laboratory analysis will be studied. Using a problem-oriented approach, probability, normal values, analysis of variance and quality control as well as the relationship of these procedures to patient care will be studied.  
Class 3, Credit 3 (S)

SCLS-722  
**Clinical Laboratory Computer Applications**  
Registration #1023-722  
The basic concepts of data processing, as well as the design evaluation and utilization of computer systems in both hospital and clinical laboratories, will be studied. The legal aspects of biomedical data processing as well as instrument interfacing will also be studied.  
Class 3, Credit 3 (offered every other year)

SCLS-820  
**Advanced Clinical Chemistry I**  
Registration #1023-820  
Quality control, statistics, electrolytes, acid-base physiology, renal function, trace metals, lipids, carbohydrate metabolism, enzymes, and various standard methods are covered. (Permission of instructor)  
Class 4, Credit 4 (offered every other year)

SCLS-821  
**Advanced Clinical Chemistry II**  
Registration #1023-821  
A study of the concepts and applications of therapeutic drug monitoring, pharmacokinetics, toxicology, inherited disorders of metabolism, liver function tests, protein measurement, hepatitis, porphyrias, vitamins, pediatric clinical chemistry, geriatric clinical chemistry, and gene probes. (Permission of instructor)  
Class 4, Credit 4 (offered every other year)

SCLS-822  
**Advanced Clinical Chemistry III**  
Registration #1023-822  
A survey of endocrinology and of the immunoassay methods used in performing endocrine assays. The endocrine systems covered include the thyroid, the adrenals, calcium inetaoc sm, growth hormone, the human reproductive system, and the fetal-placental unit. The survey of immunoassay includes the fundamental principles of both isotopic and nonisotopic immunoassay plus a brief discussion of data reduction methods.  
Class 4, Credit 4 (offered every other year)

SCLS-870  
**Clinical Chemistry Seminar**  
Registration #1023-870  
Credit 1 (W)
In response to student and/or faculty interest, special courses which are of current interest and/or logical continuations of regular courses will be presented. These courses will be structured as ordinary courses with specified prerequisites, contact hours and examinations.

Class variable, Credit variable (offered upon sufficient request)

SCLC-877 External Clinical Chemistry Research
Research carried out in a laboratory outside of the College of Science. Prior to the initiation of external research, a proposal from the student as well as a commitment of support and direction from the laboratory are evaluated for determination of credit to be awarded.

Credit variable

SCLC-899 Independent Study
Individual projects or studies carried out under the direction of a faculty member. Study objectives and design are developed through faculty-student interaction with evaluation and credit to be awarded determined after review of a study proposal.

Credit variable

Materials Science and Engineering

SESM-701 Introduction to Materials Science
The course provides an understanding of the relationship between structure and properties for development of new materials. Topics include: atomic and crystal structure, crystalline defects, diffusion theories, strengthening mechanisms, ferrous alloys, cast irons. Structure of ceramic and polymeric materials and corrosion principles. (Graduate standing or permission of instructor)

Class 4, Credit 4 (offered every year)

SESM-702 Introduction to Polymer Science
A study of the chemical nature of plastics detailing the relationships between polymerization conditions, structure and properties in both the solid and fluid states.

Class 4, Credit 4 (offered every year)

SESM-703 Solid State Science
This course will survey topics in the physics of solids. Included in these will be crystal symmetry, structure, and binding; mechanical, thermal, and electrical properties of insulators, semiconductors, and conductors including band theory.

Class 4, Credit 4 (offered every year)

SESM-704 Introductory Theoretical Methods
Treatment of waves and fields; selected topics of interest in electrodynamics and fluid mechanics; statistical mechanics; Maxwell-Boltzmann, Bose Einstein, and Fermi-Dirac distributions and their applications.

Class 4, Credit 4 (offered every year)

SESM-705 Introductory Experimental Techniques
The course introduces the student to laboratory equipment for hardness testing, impact testing, tensile testing, x-ray diffraction, and thermal treatment of metallic materials. Experiments illustrating the characterization of high molecular weight organic polymers will be conducted.

Class variable, Lab variable, Credit 4 (offered every year)

SESM-706 Experimental Techniques: Thin Films
Production of thin films of metals and dielectrics by physical vapor deposition. Lectures cover vacuum systems, evaporation, sputtering, nucleation and growth of thin films, analysis and characterization of thin films, and application of thin films. Laboratories cover use of vacuum systems in evaporation and sputtering and some methods of characterizing the thin films thus produced. (Permission of instructor)

Class variable, Lab variable, Credit 4

SESM-707 Experimental Techniques: Electron Microscopy & Spectroscopy
The course includes a detailed study of scanning electron microscopy and modern applications in microelectronic engineering.

Class variable, Lab variable, Credit 4

SESM-708 Experimental Techniques
This course is designed to provide an in-depth integrated approach to the analysis, investigation and development of materials, concentrating on specific types or classes.

Class variable, Lab variable, Credit 4

SESM-710 Materials Properties and Selection
A study of the principles of material behavior as applied to design. Application of materials according to these principles is stressed. Ferrous, nonferrous, and nonmetallic materials are considered.

Class 4, Credit 4

SESM-714 Glass Science
Topics covered will include the structure and properties of glass, applied areas such as glass melting and processing, and technological applications of glass.

Class 4, Credit 4 (W, S)
This course introduces the student to the basic electrochemical nature of corrosion and considers the various factors which influence the rate of corrosion in a variety of environments. Various means of controlling corrosion are considered. (SESM-701 or equivalent)

Class 4, Credit 4

This course is designed to meet the needs of students in the area of organic chemistry related to synthesis, polymerization mechanism, structures, stereochemistry and reactions of organic polymers and their industrial usage. (SESM-702 or equivalent)

Class 4, Credit 4

A study of the theoretical and experimental methods available for designing plastics products and selecting appropriate materials, with special emphasis on the interrelationships between materials, product design, tooling construction and manufacturing producibility. (SESM-702 or equivalent)

Class 4, Credit 4

Fundamentals of geometrical and physical optics; interaction of radiation with matter; dielectrics and thin films; introduction to electro-optic and acousto-optic effects. (SESM-704 or equivalent)

Class 4, Credit 4

Band structures of pure and doped solids and solid compounds, transport phenomena, semiconduction, optical properties, galvanomagnetic and magneto-optic effects. (SESM-701 and 704 or equivalents)

Class 4, Credit 4

Lasers: theory, types and construction; optics of metals; multilayer dielectrics; electro- and acousto-optic modulators and deflectors; optical detectors. (SESM-730 or equivalent)

Class 4, Credit 4

Electrical, thermal, and optical properties of amorphous materials; model of conduction. (SESM-701, 703, 704 or equivalents)

Class 4, Credit 4
School of Business
Careers

Applied Accounting

**NBTA-100**
**Registration #0801-100**
**Career Exploration: Business Technologies**
This course is designed to help students collect the information necessary to make an appropriate decision regarding careers in accounting and office occupations. Students learn about the nature of accounting and office jobs, work environments, career options, and program requirements through a combination of group and individual activities that include presentations by faculty members and related professionals, panel discussions, class observations, and student interviews.
Class 1, Credit 1 (F, W, S)

**NBTA-201**
**Registration #0801-201**
**General Accounting I**
This course is an introduction to accounting for both accounting and non-accounting students. Topics covered are the basic accounting equation; the recording of transactions using debits and credits; general and subsidiary ledgers; and the accounting cycle, including recording transactions for service and merchandising enterprises, preparing trial balances, adjusting and closing processes, and preparing basic financial statements. Spreadsheet applications are used on microcomputers.
Class 6, Credit 3 (F)

**NBTA-202**
**Registration #0801-202**
**General Accounting II**
This course is a continuation of General Accounting I for both accounting and non-accounting students. Topics covered include the calculation of interest on notes and the discounting of notes, adjustment for uncollectable accounts, merchandise inventory systems and calculations, internal control, and the voucher system. Coursework includes recording transactions in special journals and a practice set that applies accounting concepts in a simulated business situation. Spreadsheet applications are used on microcomputers. (NBTA-201)
Class 6, Credit 3 (W)

**NBTA-231, 232**
**Fundamentals of Economics I, II**
**Registration #0801-231, 232**
This two-course sequence gives an overview of micro- and macroeconomic concepts. Students examine economic problems in a rational manner by learning the fundamental processes of economic analysis and the skills of economic reasoning. These courses include selected knowledge and skills from the economic discipline presented in the form of concepts and understandings deemed most important to economic literacy for students. (Applied accounting associate degree status, NBTA-101)
Class 3, Credit 3 (NBTA-231, W; NBTA-232, S)

**NBTA-251**
**Applied Accounting I**
**Registration #0801-251**
This course for accounting students is a continuation of General Accounting I and II. Topics covered include a computerized review of the accounting cycle and financial reports, the components of a payroll system, the calculation and recording of employee earnings and employer payroll taxes, the recording and adjusting of deferrals and accruals, partnerships, and depreciation or amortization of assets. Coursework includes a computerized practice set designed to summarize General Accounting I and II and Applied Accounting I in a simulated business situation. (NBTA-202)
Class 6, Credit 4 (S)

**NBTA-252**
**Applied Accounting II**
**Registration #0801-252**
This course introduces students to cost accounting with an emphasis on job order costing. Topics covered include manufacturing statements; cost theory; and integration of materials, labor, and overhead to the computerized job cost situation. The course culminates with practical application of course content through a practice set. Computer applications include spreadsheets. (NBTA-251)
Class 6, Credit 4 (F)

**NBTA-253**
**Applied Accounting III**
**Registration #0801-253**
This course is a continuation of cost accounting, with particular concentration on process and managerial aspects. Topics covered include average and FIFO process costing methods, equivalent units, multiple products, changes in units, budgeting, cost classification, and computerized applications. Computer applications include spreadsheets, graphics, and data bases. (NBTA-252)
Class 6, Credit 4 (W)

**NBTA-254**
**Applied Accounting IV**
**Registration #0801-254**
This course consists of managerial accounting topics and concepts. Topics covered include financial analysis, accounting concepts and principles, statement of cash flow, and corporate accounting. Computer applications include spreadsheets. (NBTA-253)
Class 6, Credit 4 (S)

**NBTA-260**
**Applied Accounting Techniques**
**Registration #0801-260**
This course gives students an opportunity to reinforce and apply accounting topics and skills previously studied. Students work in a simulated accounting office as accounting clerks and perform a variety of general and process costing duties. Computer applications include cost accounting, general ledger, spreadsheets, graphics, and data bases. (NBTA-253)
Class 6, Credit 2 (S)
Business Occupations/
Business Technology/
Office Technologies

NBTP-101 Orientation to Business
Registration #0804-101
This course is a broad overview of the form and structure of American business. It provides students with a basic knowledge of the history, organization, and operation of business and its particular vocabulary. Students use a microcomputer in a market simulation.
Class 3, Credit 3 (F, W, S)

NBTP-110 Business English
Registration #0804-110
This self-paced course provides proofreading and editing skills as they relate to typewritten communications. Course content includes rules for word division, capitalization, numbers, abbreviation style, spelling, and business letter writing. This course is designed specifically for students enrolled in courses in the business occupations department.
Class 3, Credit 3 (W, S)

NBTP-111, 112, 113 Beginning Typing I, II, III
Registration #0804-111, 112, 113
These courses are for students with limited typing experience and for those who type below 30 net words per minute. The courses focus on keyboard training, skill development, and basic formatting. Business correspondence, reports, and tables are produced on electronic typewriters and microcomputers using WordPerfect software. Students are expected to exit Beginning Typing II with a net speed of 20 words per minute for five minutes and to exit Beginning Typing III with a net speed of 30 words per minute for five minutes. (NBTP-111 for NBTP-112; NBTP-112 for NBTP-113)
Class 5, Credit 2 (F, W, S)

NBTP-114 Keyboarding
Registration #0804-114
This course is offered to students who possess 0-20 words per minute keyboarding speed. The focus of the course is to facilitate inputting of alphabetic, numeric, and other character information on a microcomputer and on an electric typewriter using a standard keyboard. Students are expected to exit this course with a keyboarding speed of 25 words per minute for three minutes. This course is open to all NTID students.
Class 4, Credit 2 (F, W, S)

NBTP-115 Word Processing Foundations
Registration #0804-115
In this elective course, students learn to use the microcomputer with a popular software package to complete a variety of word-processing projects. The course, offered to students in all NTID programs except business technologies (AOS) and office technologies, teaches students to put words into print efficiently. Prior keyboarding experience is helpful.
Class 2, Lab 2, Credit 2 (F, W, S)

NBTP-124 Introduction to Data Processing
Registration #0804-124
This course gives students a background in data processing. It presents the concepts and techniques in the processing of data and is directed to the needs and requirements of students.
Class 2, Credit 2 (F, W, S)

NBTP-211, 212 Business Procedures I, II
Registration #0804-211, 212
This sequence of courses develops basic skills in current business procedures related to general office functions. Skills include the use of electronic mail; current records management systems and introduction to paradox data bases; the correct use of business machines; and the manual and automated computerized keeping of payroll records using Lotus 1-2-3 software. Students develop skills applicable to a variety of office settings.
Class 5, Credit 3 (NBTP-211, F, W; NBTP-212, W, S)

NBTP-221 Advanced Typing I
Registration #0804-221
The emphasis of this course is on the improvement of basic skills and their application to a variety of realistic office projects. Students type correspondence, reports, manuscripts, business forms, and tabulations on a microcomputer using WordPerfect software. Applied accounting and office technologies students are expected to exit with a net speed of 40 words per minute for five minutes. (NBTP-113)
Class 5, Credit 3 (F, W, S)

NBTP-230 Office Technologies Seminar
Registration #0804-230
This course gives students an opportunity to prepare for employment through field trips, mentoring, and guest lectures. Topics for discussion are identified by students enrolled in the seminar. Topics covered may include time management, career development, and personal/social development skills necessary for job success. Students are expected to participate in planning class sessions. (Office technology diploma status)
Class 4, Credit 2 (S)

NBTP-284 Fundamentals of Management
Registration #0804-284
This course focuses on theory and practice basic to the management process. Students use case studies, lectures, and simulations to study planning, organizing, directing, staffing, and controlling functions. The course also introduces students to motivation and leadership theory as it relates to the role of a manager. (NBTP-101)
Class 3, Credit 1 (F, W)

NBTP-286 Fundamentals of Marketing
Registration #0804-286
This course is an introduction to the field of marketing and its strategies. Topics include consumer behavior and its effect in the marketplace, product research and planning, pricing, distribution channels, marketing institutions, advertising and promotion, and organization. (NBTP-101)
Class 3, Credit 3 (S)

NBTP-290 Small Business Organization and Management
Registration #0804-290
This is an elective course designed for business students but available to students from another technical program who have completed the prerequisites and have a desire to learn entrepreneurial skills for starting a business. Each student will write a business plan describing a selected business. (NBTP-201, NBTP-284, or NBTP-286)
Class 4, Credit 3 (S)
NBTP-291  
**Applied Business Techniques**  
Registration #0804-291  
This course gives students an opportunity to review skill-oriented coursework on a microcomputer and electric typewriter prior to graduation and job entry. Skill review includes production and speed typing, business machines, payroll procedures, records management techniques, and word processing operations and applications using various word processing software packages. (NBTP-301)  
Class 3, Credit 2 (F, W, S)

NBTP-299  
**Co-op Work Experience**  
Registration #0804-299  
Credit 0 (Su)

NBTP-301  
**Word Processing I**  
Registration #0804-301  
This self-paced course provides an introduction to basic word processing concepts and a discussion of various types of word processing office systems and procedures. Students learn basic documentation capabilities of the Xerox 6085 Professional Computer system. (NBTP-221)  
Class 4, Credit 4 (F, W, S)

NBTP-302  
**Word Processing II**  
Registration #0804-302  
This self-paced course provides a continuation of the word processing concepts and applications presented in Word Processing I. Using the Xerox 6085 Professional Computer system, students learn applications, including creation of fill-in forms and tables, and are introduced to basic graphics. (NBTP-301)  
Class 4, Credit 4 (F, W, S)

NBTP-303  
**Word Processing III**  
Registration #0804-303  
This self-paced course provides a continuation of the word processing concepts and applications presented in Word Processing II. Using the Xerox 6085 Professional Computer system, students learn procedures for creating basic business and data-driven graphics that are prepared in the office environment. (NBTP-301)  
Class 4, Credit 4 (F, W, S)

NBTP-304  
**Word Processing IV**  
Registration #0804-304  
This self-paced course contains the concepts and applications for creating, maintaining, and printing files. Using the Xerox 6085 Professional Computer system and microcomputers, students use files to create repetitive letters, lists, and reports. Students also are exposed to advanced files.  
Class 4, Credit 4 (F, W, S)

NBTP-310  
**Desktop Publishing Concepts and Applications**  
Registration #0804-310  
This course for students in the office technologies program provides an introduction to the field of desktop publishing and telecommunications, utilizing word processing and microcomputer equipment. Students create documents on word processing equipment that contains business graphics, clip art, and self-created graphics. Current software programs also are introduced and provide a working knowledge of microcomputer-based desktop publishing. In addition to required projects, students select and design documents of their choice. (NBTP-303)  
Class 4, Credit 3 (F, S)

NBTP-399  
**Independent Study**  
Registration #0804-399  
Credit Variable

## Applied Computer Technology

**Note:** Required laboratories may take place during evening hours or on Saturdays.

**NBTD-100  Logic and Problem Solving**  
Registration #0802-100  
This course provides a programming language-independent introduction to problem solving and logic development on computers. Topics include techniques for problem analysis and identification, basic logical operators, and the fundamental logic structures and program components used in computer programming.  
Class 3, Credit 2 (F, W)

**NBTD-101  Introduction to Business Programming**  
Registration #0802-101  
This course introduces students to computer programming concepts. The course focuses on problem analysis, design, and writing of typical business applications with emphasis on logic skill development. The course serves as a foundation for future programming courses. (NBTD-100, NTMM-140)  
Class 4, Credit 4 (F, W, S)

**NBTD-105  Career Exploration—Data Processing**  
Registration #0802-105  
This course is designed to help students collect the information necessary to make appropriate decisions about possible careers in data processing. Students are given opportunities to explore their interest in data processing through a combination of hands-on experiences with computers, presentations by faculty members and outside professionals, field trips, class observations, and student/faculty interviews. The course offers a unique integration of technical instruction and career counseling that enhances students’ decision-making and career-planning abilities.  
Class 3, Credit 2 (F, W, S)

**NBTD-157  Beginning Computer Operations**  
Registration #0802-157  
This course provides an introduction to information processing and the types of computer equipment used in business. Topics include hardware platforms, peripheral equipment, software, and job processing. (Corequisite: NBTD-158)  
Class 3, Credit 2 (F, W)

**NBTD-158  Beginning Computer Operations Laboratory**  
Registration #0802-158  
Students are given hands-on experience with one or more computer systems. (Corequisite: NBTD-157)  
Lab 2, Credit 1 (F, W)

**NBTD-170  Utilities/JCL for Computers**  
Registration #0802-170  
This course presents the use of job control language (JCL) and utilities as applicable to a typical mainframe operations data center environment. The JCL examples discussed include jobs for standard system utilities and production work. (NBTD-157)  
Class 3, Credit 2 (W, S)
NBTD-172  Utilities/JCL Lab  
Registration #0802-172  
This lab provides hands-on experience related to the Utilities/JCL for Computers course lecture. Students write and run a variety of JCL jobs for typical system utilities and production work in a mainframe data center environment. (Corequisite: NBTD-170) (NBTD-157)  
Lab 3, Credit 1 (W, S)

NBTD-213  Applications Software  
Registration #0802-213  
This course is an introduction to the use of computer application software in a variety of work settings. Students work on computers to solve a variety of problems.  
Class 3, Credit 3 (F, W, S)

NBTD-214  Spreadsheet Software  
Registration #0802-214  
This is an in-depth study of spreadsheets and how they are used as a productive tool in business. Students are given hands-on instruction on how to create and manipulate spreadsheets to solve common business problems and use the built-in language found in spreadsheet software to automate the solution to a variety of spreadsheet problems. The most popular spreadsheet software currently used in business is discussed. (NBTD-101, 213, 222)  
Class 3, Credit 3 (F, W, S)

NBTD-215  Microcomputer Database Software  
Registration #0802-215  
This course covers creating, inquiring, reporting, and other data base functions. Several leading data base software products for microcomputers are studied. Similarities and differences of these and other data base software products are analyzed. Data base utilization in the business environment and application to the students' expected work environment are presented. (NBTD-213)  
Class 3, Credit 3 (W, S)

NBTD-220  Computer Hardware I  
Registration #0802-220  
This course introduces students to the fundamental concepts of computer hardware. Topics include basic computer hardware components, I/O, secondary storage devices, data communications/network equipment, and media. (NBTD-157)  
Class 3, Credit 3 (F, S)

NBTD-221  Computer Hardware II  
Registration #0802-221  
This course provides students with methodologies and hands-on activities related to the setup, configuration, upgrading, and troubleshooting of computers. Topics include examination of microcomputer hardware components, disassembly/reassembly and connection of equipment, and problem diagnosis. (NBTD-220)  
Class 3, Credit 3 (F, W)

NBTD-222  Software and Operating Systems I  
Registration #0802-222  
This course discusses the popular microcomputer operating system used in business. Topics include operating system concepts and system-level commands as well as commands relating to program, file, and application management. Directories and subdirectories are discussed as part of file classification and naming conventions. There also is discussion of typical microcomputer management tasks such as installing and configuring applications software packages, formatting both floppy and hard disks, partitioning hard disks for optimum efficiency, and performing system backups. Several operating systems are examined. (NBTD-157)  
Class 4, Credit 3 (W, S)

NBTD-224  Networking I  
Registration #0802-224  
This course focuses on stand-alone local area networks (LANs) of microcomputers. Students study network topologies, cabling, protocols, and network operating systems. Activities include network setup and reconfiguration, software installation, and identification and correction of hardware and software incompatibility problems. (NBTD-220)  
Class 3, Credit 3 (F, S)

NBTD-225  Networking II  
Registration #0802-225  
This course builds upon Networking I. Topics focus on connecting local area networks (LANs) of personal computers with wide area networks (WANs) with mini, mid-sized, and mainframe computers. (NBTD-221, 224)  
Class 3, Credit 3 (F, W)

NBTD-230, 231 Business Programming in COBOL I, II  
Registration #0802-230, 231  
This is a two-quarter sequence in COBOL programming. Students learn printing of reports, general processing of files, and updating of random access files. The two-course sequence is intended to give students beginning skills in COBOL programming. (NBTD-101 for NBTD-230; NBTD-230 for NBTD-231)  
Class 4, Credit 3 (W, S)

NBTD-232  RPG Programming I  
Registration #0802-232  
This course provides an introduction to report program generator (RPG) language. Course content includes developing program logic, flowcharting, writing programs in RPG, entering the programs and related files, debugging, and executing the programs on a small to mid-range computer system. Break logic, exception reporting, and the use of data bases for input are discussed. (NBTD-101)  
Class 3, Credit 3 (F, W)

NBTD-233  RPG Programming II  
Registration #0802-233  
This is a continuation of RPG Programming I. Course topics include the use of external files, the processing power of RPG III versus RPG II, screen design, real-time inquiry, the update process using RPG III, and creation of data entry files. (NBTD-232)  
Class 3, Credit 3 (W, S)
This two-quarter sequence in programming teaches the language currently used by RIT’s School of Computer Science. Emphasis is placed on the use of tables/arrays and sorting. These courses are intended for students who plan to pursue a baccalaureate degree in computer science. (Michigan Test score higher than 70 California Reading Test score higher than 9.0, NBTD-101 for NBTD-235; NBTD-235 for NBTD-236)

Class 4, Credit 3 (W, S)

In this course, students learn to use assembler language to program the computer on a low-level basis. The major emphasis of the course is on the actual machine language of the computer and the CPU works. The language taught (BAL) is not intended for use as a business programming language. (NBTD-240)

Class 4, Credit 3 (F, W)

This course is a continuation of Assembler Language Programming. It focuses on using assembler language as a programming language. (NBTD-241)

Class 4, Credit 3 (W)

This course provides students with an in-depth discussion of computer systems that operate in multiprogramming mode. Queue and general control of a spooling system are the main topics covered. (Corequisite: NBTD-251) (NBTD-170)

Class 2, Credit 2 (F, S)

This laboratory provides hands-on experience related to Multiprogramming/Spooling for Operators. Students develop skills in working with queues and spooling programs. (Corequisite: NBTD-250)

Lab 2, Credit 1 (F, S)

Students learn the various parameters as well as the design of a medium-scale operating system from an operator's viewpoint. (Corequisite: NBTD-261) (NBTD-170)

Class 2, Credit 2 (F, W)

Students receive hands-on experience in working with a medium-scale operating system. Exercises support concepts presented in System Generation for Operators. (Corequisite: NBTD-260)

Lab 3, Credit 1 (F, W)

Designed as a continuation of System Generation for Operators, this course focuses on the software that makes up a total computer system. Topics covered are the major operating system software components, compilers, and utilities. (Corequisite: NBTD-263) (NBTD-260)

Class 2, Credit 2 (F, S)

Students in this laboratory investigate the software related to operating systems. (Corequisite: NBTD-262)

Lab 1, Credit 1 (F, S)

This course provides a hands-on introduction to the use of desktop publishing software on several computer platforms. The mechanics of the use of software products to create and integrate text and graphics are presented. Technical topics, including file formats and file exchange, are stressed over design considerations. (NBTD-213, 220, 222; NGGE-218; third-year status or department approval)

Class 3, Credit 3 (W)

This course introduces students to the use of data base systems on computers. Students design a data base for an information system of their choice. (Two-quarter sequence in programming [language is not important], English Composition Placement Test)

Class 4, Credit 4 (W, S)

In this course, students learn to store and use maintenance in- formation in files. Major topics include the various forms of storage and organization of files, backup and restore, and areas such as security and confidentiality. (One 200-series programming course, English Composition Placement Test)

Class 4, Credit 3 (F)

This course is a continuation of Programming for Computer Science Students II. The sorting process and the concepts of trees and pointers are discussed and programmed. This course is for students interested in pursuing a baccalaureate degree in computer science. (NBTD-236, NTMM-151)

Class 4, Credit 4 (F)
NBTD-340  Maintenance Programming  
Registration #0802-340
In this course, students learn the maintenance process of the programming environment and how to recognize other individuals' styles and logic as well as standards needed to alter existing programs. Students are given language syntax to correct as well as programs to alter, correct, and revise following a set of standards. This course is for students interested in COBOL business programming. (NBTD-231)
Class 4, Credit 3 (F)

NBTD-350  Large-Scale Systems  
Registration #0802-350
In this course, students are introduced to large-scale systems and their operation. The content of this course varies depending on the systems available. The topics are related to the support functions in large computer installations. (Corequisite: NBTD-351) (One 200-series programming course, NBTD-250)
Class 2, Credit 2 (W)

NBTD-351  Large-Scale Systems Laboratory  
Registration #0802-351
This laboratory supports the concepts of Large-Scale Systems. Students are assigned to set up and operate a medium- to large-scale system and have the opportunity to work in a large-scale computer installation. Laboratory meetings will be based on availability of systems. (Corequisite: NBTD-350)
Lab 2, Credit 1 (W)

NBTD-360  Small Business Systems  
Registration #0802-360
In this course, students learn the use of micro- and minicomputers in the small business environment. Students are assigned to operate a small business computer for a normal business cycle. This course requires extensive laboratory work outside of class. (Corequisite: NBTD-361) (One 200-series programming course)
Class 2, Credit 2 (F, S)

NBTD-361  Small Business Systems Laboratory  
Registration #0802-361
This is not a structured laboratory. Student projects are done in a combined class and laboratory environment. Students are responsible for successful management of financial work, inventory control, and payroll systems. (Corequisite: NBTD-360)
Lab 3, Credit 1 (F, S)

NBTD-390  Data Processing Seminar  
Registration #0802-390
This seminar provides a relevant framework for students' previous data processing courses and, by emphasizing new directions in data processing, also prepares students for continued growth on the job. Students may study independently a topic agreed upon with the instructor.
Class 1-3, Credit Variable (F, W, S)

NBTD-399  Independent Study  
Registration #0802-399
Credit Variable (F, W, S)

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School of Science and Engineering Careers

Architectural Technology

NETA-100  Career Exploration: Architectural Technology  
Registration #0808-100
This course provides students with information regarding careers in architectural technology. Activities may include field trips, hands-on experiences, career information presentations, and interaction with graduates of the program and professionals in the field. These experiences help students understand work activities, conditions, and settings.
Lab 3, Credit 1 (F, W, S)

NETA-110  Construction Terminology  
Registration #0808-110
This course introduces students to the basic technical vocabulary for the construction industry. Topics include drafting equipment and procedures, materials, structural components, mechanical and electrical systems, site work, construction equipment, and procedures.
Class 4, Credit 4 (F)

NETA-111  Construction Drafting I  
Registration #0808-111
This course introduces students to the basic drafting techniques for construction projects. Topics include line quality, lettering, scale measurement, dimensioning, drafting media and equipment, graphic reproduction methods, sheet layout, floor plans, site plans, sections, and isometric views. Students begin to develop a portfolio of their best work. (Corequisite: NETA-110)
Lab 6, Credit 2 (F)

NETA-112  Construction Drafting II  
Registration #0808-112
In this course, students continue to learn and practice basic drafting techniques for construction projects. Topics include field measurement and measured drawings, preliminary drawings, basic rendering, base maps, perspectives, and site plans. Students also begin learning basic computer-assisted drafting (CAD) skills. (Corequisite: NETA-201) (NETA-111)
Lab 6, Credit 2 (W)

NETA-113  Construction Drafting III  
Registration #0808-113
This course introduces students to the basic drafting techniques for construction projects. Topics include field measurement and measured drawings, preliminary drawings, basic rendering, base maps, perspectives, and site plans. Students also begin learning basic computer-assisted drafting (CAD) skills. (Corequisite: NETA-201) (NETA-111)
Lab 6, Credit 2 (S)
NETA-201 Construction Methods and Procedures I
Registration #0808-201
This is the first of two courses that orient students to the processes of building project development in design offices and at construction sites. This course concentrates on the processes of preliminary design, design development, production of contract documents, and bidding. Topics include roles of owners, consultants, and contractors; working drawings; specifications; analysis of total project; and bidding. (Corequisite: NETA-112) (NETA-110)
Class 3, Credit 3 (W)

NETA-202 Construction Methods and Procedures II
Registration #0808-202
This course continues the orientation of students to the total building project development. In this course, students learn about construction processes. Topics include fabrication, placement, support, and fastening of building parts; identification and understanding of construction equipment; and scheduling of construction operations. (Corequisite: NETA-113) (NETA-201)
Class 3, Credit 3 (F)

NETA-211 Architectural Materials I
Registration #0808-211
This course provides information about materials used in construction. Students learn the characteristics, origins, sources, standard shapes, sizes, and units of measure for materials and manufactured products. Students use the standard referencing and indexing system for materials and products. (NETA-202)
Class 3, Credit 3 (F)

NETA-212 Architectural Materials II
Registration #0808-212
In this course, students apply information from the previous course, Architectural Materials I. Topics include building codes, comparison of materials, selection of materials and products for specific applications, and detailing. (NETA-211)
Class 3, Credit 3 (W)

NETA-220 Principles of Structural Systems
Registration #0808-220
Students identify and describe the major structural systems and their components. These systems include steel frame, cast-in-place concrete, precast concrete, masonry, steel joists, trusses, light frame, and heavy timber. Students read structural framing plans, details, and schedules. (NETA-212)
Class 4, Credit 4 (S)

NETA-221, 222, 223 Architectural Design Drafting I, II, III
Registration #0808-221, 222, 223
In this sequence of three courses, students learn drafting production techniques, production scheduling, and self-monitoring of progress. Students will produce drawings for one or more building projects during the three courses. The process will include preliminary drawings; design development; architectural working drawings; and working drawings for the mechanical, electrical, and structural elements of the project. Drawings may include cover sheets; site plans; floor plans; interior and exterior elevations; building, wall, and detail sections; interior and exterior perspectives; axonometric views; schedules; and diagrams. Students apply both manual and CAD drafting skills.
(NETA-113 for NETA-221; NETA-221 for NETA-222; NETA-222 for NETA-223)
Lab 12, Credit 4 (NETA-221, F; NETA-222, W; NETA-223, S)

NETA-224 Construction Computations
Registration #0808-224
This course introduces students to the basic techniques for calculating linear area, volume, and application of electronic spreadsheet techniques. Students apply basic math, algebra, geometry, right triangle trigonometry, law of sines, and law of cosines. (NTMM-151)
Class 2, Credit 2 (W)

NETA-299 Co-op Work Experience
Registration #0808-299
Credit 0 (Su)

NETA-340 Planning Project
Registration #0808-340
This course introduces students to the basic techniques for planning surveys. These include base map preparation, data collection from field surveys and public records, data base management, data analysis, graphic presentation of data, project organization, and work discipline skills. Students work as a team to perform an original planning survey. Students work in the field and in the laboratory. (NETA-223)
Lab 15, Credit 5 (F)

NETA-351,352 Architectural Projects I, II
Registration #0808-351,352
In this sequence of two courses, students complete one or more building design projects. Activities may include field inspection and measurement, measured drawings, preliminary design, presentation design development, models, and working drawings. The courses simulate the environment of an architectural office. (NETA-340 for NETA-351; NETA-351 for NETA-352)
Lab 15, Credit 5 (NETA-351, W; NETA-352, S)

NETA-375 Architectural History
Registration #0808-375
Students learn the major elements of architectural styles and building technologies throughout the history of Western architecture. This provides a background for discussion of current topics in the field of building design and construction.
Class 2, Credit 2 (S)

NETA-376 Building Estimating
Registration #0808-376
Students learn and apply basic concepts and skills for calculating the cost of a building project. Topics include elements of project cost, quantity survey techniques, material costs, installation costs, unit cost information sources, cost analysis, adjustments for locality, historical cost indexes, contingencies, overhead, and profit. (NETA-224 or NETA-128)
Class 2, Credit 2 (S)

NETA-377 Building Equipment
Registration #0808-377
Students learn to identify and understand the basic equipment and operation of mechanical and electrical systems in a building. These systems include water supply, drainage, fire protection, heating, ventilating, air conditioning, power, lighting, and conveying systems. Students become acquainted with the graphic representation for these systems in working drawings. (NETA-202)
Class 3, Credit 3 (F)
NETA-390  Architectural Technology Seminar
Registration #0808-390
This course helps students prepare for the job search and for employment. Topics related to job search include applications, resumes, interviews, and use of a portfolio. Topics related to the world of work include taxes, insurance, employee benefits, credit ratings, marriage, and deaf professionals.
Class 1, Lab 3, Credit 2 (W)

NETA-399  Independent Study
Registration #0808-399
Credit Variable

Civil Technology

NETC-100  Career Exploration: Civil Technology
Registration #0809-100
This course provides students with information regarding a career in civil technology. Activities may include field trips, hands-on experiences, career information presentations, and interaction with graduates of the program and professionals in the field. These experiences help students understand work activities, conditions, and settings.
Lab 3, Credit 1 (F, W, S)

NETC-211  Surveying and Mapping
Registration #0809-211
This course combines the elements of surveying and mapping. Students have the opportunity to use survey equipment in the field to obtain and record angle, distance, and elevation measurements. Using the information gathered in the field, students perform calculations and produce drawings for a term project. Topics include error of closure, bearings, interior angles, distances, coordinates, slope, reducing field notes, and cut and fill volumes. Students draw with lead and ink on a variety of media and also use the CAD system to produce drawings. (NETA-113, NTMM-152)
Class 6, Lab 4, Credit 6 (S)

NETC-241  Mapping I
Registration #0809-241
This course allows students to work on a variety of assignments that focus on land planning and site design. Course topics include calculating angles, bearings, distances, co-ordinates and slope; analyzing proposed and existing contours; preparing a topographic base map; and drawing cross sections and a final site plan. Students use both manual drafting and CAD to produce drawings. (NETA-113, NTMM-152)
Lab 3, Class 1, Credit 2 (S)

NETC-250  Statics
Registration #0809-250
This course requires students to apply physical concepts of equilibrium in co-planar force systems to structural members. Topics include vectors, forces, moments, equilibrium, distributed forces, centroids, and centers of gravity. Students calculate reactions, moments, and internal forces in beams, trusses, and frames. (NTMM-152, NTSP-203)
Class 3, Lab 3, Credit 4 (F)

NETC-260  Strength of Materials
Registration #0809-260
Students apply physical concepts of matter to calculate how forces affect structural members. Topics include stress, strain, behavior of common engineering materials, moment of inertia, section modulus, and basic beam theory. Students calculate the maximum tensile, compressive and shear stresses, and deflection in simple members. They also calculate deflection of beams and select simple tension, compression, and bending members and their connections. (NETC-250)
Class 3, Lab 3, Credit 4 (W)

NETC-283  Soil Mechanics
Registration #0809-283
This course introduces students to the characteristics of soils related to construction projects. Topics include visual and laboratory classification of soils, compaction, sub-surface investigation, percolation, and soil nomenclature. Students perform laboratory experiments and tests and write laboratory reports.
Class 3, Lab 3, Credit 4 (W)

NETC-284  Engineering Materials
Registration #0809-284
Students investigate the basic engineering properties of portland cement concrete, portland cement mortar, and asphaltic cement concrete. They learn and practice standard laboratory testing procedures and write laboratory reports. (NETC-283)
Class 2, Lab 6, Credit 4 (S)

NETC-285  Civil Technology Seminar
Registration #0809-285
This course provides an overview of the field of civil technology. Students learn how the field is related to the profession of civil engineering. The course also introduces research and laboratory report writing, resume writing, and interviewing skills.
Class 1, Lab 3, Credit 2 (F)

NETC-290  Programming for Civil Technicians
Registration #0809-290
This course introduces basic computer skills. Topics include keyboard operation, expressions, variables, programs, branching, input, subscripted variables, and loops. Students have hands-on experience on the computer.
Class 2, Lab 3, Credit 3 (F, W, S)

NETC-299  Co-op Work Experience
Registration #0809-299
Credit 0 (Su)

NETC-311  Surveying Projects
Registration #0809-311
Students continue to learn the basic techniques of land measurement. Topics include electronic distance measurement (EDM), theodolites, modern levels, deed descriptions, deed research, tape locations, horizontal and vertical curves, aerial surveying, and surveying computations. Students have hands-on experience with surveying equipment in the field. (Corequisite: NETC-242) (NETC-231, 241)
Class 1, Lab 6, Credit 3 (F)
NETC-312  Mapping and Site Design
Registration #0809-312
Students apply skills learned in Mapping I to complete a site planning project. Requirements for the project include topographic, traverse, and highway mapping; cut and fill calculations; drafting with pencil and ink on a variety of media; and graphic reproduction. (Corequisite: NETC-232) (NETC-231, 241)
Class 1, Lab 3, Credit 2 (F)

NETC-321,322,323  Structural Design Drafting
Registration #0809-321,322,323 I, II, III
In this sequence of courses, students apply the principles of statics and strength of materials and drafting skills. Students learn the basic principles of structural analysis and design, estimating quantities, preparation of structural and shop drawings, and construction. The first course and half of the second course concentrate on steel structures. The rest of the second course and the third course concentrate on concrete structures. (NETC-260 for NETC-321; NETC-321 for NETC-322; NETC-322 for NETC-323)
Class 2, Lab 6, Credit 4 (NETC-321, F; NETC-322, W; NETC-323, S)

NETC-340  Fundamentals of Fluid Mechanics
Registration #0809-340
This course introduces students to the basic principles of fluid statics and fluid flow. Topics include hydrostatic pressure, forces on submerged surfaces, buoyancy, laminar and turbulent flow of incompressible fluids, fluid measurements, and open channel flow. Students perform experiments in the laboratory.
Class 3, Lab 3, Credit 4 (F)

NETC-350  Highway Design and Construction
Registration #0809-350
This course introduces students to the basic practices in the study, design, plan, preparation, and construction of transportation facilities. Topics include horizontal and vertical alignments, typical sections, hydrology, quantity estimating, intersection design, and traffic control devices. (NETC-311)
Class 3, Lab 3, Credit 4 (W)

NETC-385  Principles of Environmental Technology
Registration #0809-385
This course introduces students to the factors affecting the quality of the environment. Topics include testing, regulation, and management of water supplies, waste water, soil erosion, solid wastes, atmospheric pollutants, and noise; energy measurement and conservation; visual resource analysis; and environmental impact analysis. Field observations are an important part of this course. (NETC-340)
Class 3, Lab 3, Credit 4 (S)

NETC-390  Construction Seminar
Registration #0809-390
This course helps students prepare for their job search and employment. Topics related to job search include applications, resumes, interviews, and use of a portfolio. Topics related to the world of work include taxes, insurance, employee benefits, credit ratings, marriage, and deaf professionals.
Class 1, Lab 3, Credit 2 (W)

NETC-399  Independent Study
Registration #0809-399
Credit Variable

Electromechanical Technology

NETM-100  Career Exploration:
Registration #0811-100  Electromechanical Technology
This course provides students with information regarding a career in electromechanical technology. Activities may include field trips, hands-on experiences, career information presentations, and interaction with graduates of the program and professionals in the field. These experiences help students understand work activities, conditions, and settings.
Lab 3, Credit 1 (W, S)

NETM-101  Basic Drafting I
Registration #0811-101
This course provides instruction in the principles and techniques of basic drafting and includes an introduction to computer-assisted drafting. The emphasis is on understanding how drawings are made and used in industry. (NTMM-141)
Lab 6, Credit 2 (W)

NETM-171  Digital Systems
Registration #0811-171
This course is an introduction to logic components and how they are used in machines. Students will study gates, switches, counters, flip-flops, multiplexers, demultiplexers, truth tables, Boolean algebra, logic families, registers, and counters. (NETM-368)
Class 3, Lab 4, Credit 4 (S)

NETM-209  Technical Graphics
Registration #0811-209
This course is an introduction to electronic and mechanical drawings. Students learn how to draw using drafting standards; computer-assisted drafting experience is included. They also learn about electronic symbols, component outlines, block diagrams, schematic diagrams, cable drawings, military standards, and integrated circuits. (NETI-101, NETM-368)
Lab 6, Credit 2 (S)

NETM-210  Computer Techniques
Registration #0811-210
This course emphasizes how the computer can be used to solve problems. Students learn a programming language and develop programming skills. Students are required to solve engineering problems through hands-on computer experience. (NTSP-100)
Class 3, Lab 3, Credit 4 (W)

NETM-211  Mechanical Components
Registration #0811-211
This course introduces mechanical devices used in electromechanical equipment. The basic topics covered include torque, work, power, gears, cams, and drive systems. Students develop basic breadboarding skills. (NTM-150, NTSP-202)
Class 3, Lab 4, Credit 4 (S)

NETM-213  DC Circuits
Registration #0811-213
This course introduces students to the theory and use of direct current circuits. Students learn about direct current units and measurements, basic circuit laws, networks, Thévenin’s Theorem, and superposition theorem. (NTM-150, NTSP-202)
Class 3, Lab 6, Credit 5 (S)
NETM-234             Optical Systems
Registration #0811-234
This course introduces students to the use of optics in engineering
applications. Students learn about refraction, reflection, imaging,
fiber optics, light emitting diodes, lasers, and optically controlled
solid-state electronic devices. (NETM-369, NTMM-202)
Class 3, Lab 2, Credit 4 (F)

NETM-241             Tool Skills
Registration #0811-241
This course introduces students to the use of basic hand tools
used by electromechanical technicians. Students learn about
safety, measuring, layout techniques, cutting, finishing metal,
fasteners, drilling, counterboring, countersinking, tapping,
soldering, and wiring. The course requires the completion of
several projects. (NTMM-141)
Lab 6, Credit 2 (F, W)

NETM-299             Co-op Work Experience
Registration #0811-299
(NETM-171, 321, 368)
Credit 0 (F, W, S, Su)

NETM-304             AC Circuits
Registration #0811-304
This course emphasizes the theory and use of alternating current
circuits. Students learn about inductance, capacitance, alternating
current circuits, series, and parallel resonant circuits. (NETM-
210, 213)
Class 3, Lab 6, Credit 5 (F)

NETM-317             Kinematics
Registration #0811-317
This course emphasizes the motion of machine parts. Students
learn about linkages and levers, and the relation of these parts to
velocities, accelerations, and distances. (NETM-211, NTMM-
152)
Class 3, Lab 4, Credit 4 (F)

NETM-321             Fluid Power
Registration #0811-321
In this course, students learn how power is transmitted by using
fluids (liquids and gases). Topics covered include the character of
fluids, pumps, valves, cylinders, motors, and the piping used.
Students also learn how digital logic is used to control fluid
power valves and equipment. (NETM-317)
Class 3, Lab 4, Credit 4 (W)

NETM-322             Electrical Power Systems
Registration #0811-322
In this course, students learn how power is transmitted by
electricity. Basic topics covered include generators, motors,
transformers, and distribution lines. Both alternating and direct
current machines are covered. (NETM-304, 317)
Class 3, Lab 4, Credit 4 (S)

NETM-324             Transducers
Registration #0811-324
This course introduces students to automatic controls. Students
learn about electrical, thermal, hydraulic, and mechanical
transducers. Emphasis is on the similar operating characteristics
of all kinds of transducers. Students express results using
mathematics and graphics. (NETM-321, 368)
Class 3, Lab 4, Credit 4 (F)

NETM-325             Control Systems
Registration #0811-325
This is the second course in a sequence on the topic of automatic
controls. Students learn about the effects on a controlled process
when different ways are used to connect the input transducer to
the output transducer. The course covers open and closed loop
systems. Graphic techniques are used to help students understand
systems. (NETM-324)
Class 3, Lab 4, Credit 4 (W)

NETM-327             Microprocessor Control Systems I
Registration #0811-327
This is the first course in a two-quarter sequence. The course
introduces students to the theory of microprocessor-based control
systems. Students learn about software techniques applied to
electromechanical systems. This laboratory course emphasizes
systems analysis and troubleshooting. (NETM-171, 369)
Lab 6, Credit 2 (W)

NETM-328             Microprocessor Control Systems II
Registration #0811-328
This course emphasizes the construction, testing, and trouble-
shooting of microprocessor-based systems. Students identify and
solve problems and report solutions independently. This course is
project-based and ties together many of the concepts learned in
the electromechanical technology program. (NETM-327)
Lab 6, Credit 2 (W)

NETM-330             Circuit Analysis
Registration #0811-330
This course emphasizes the analysis of complex circuits. Students
learn about Kirchoff’s Laws, independent and dependent sources,
power, equivalent sources and resistances, Thevinin’s Theorem,
Norton’s Theorem, superposition theorem, mesh analysis, and
nodal analysis. (NETM-370)
Class 4, Credit 4 (W)

NETM-332             Statics
Registration #0811-332
This elective course covers characteristics of forces and force
systems. Emphasis is placed on vectors, levers, moments, free
body diagrams, couples, friction, and structure analysis. Problem-
solving techniques are stressed throughout the course. (NETM-
317)
Class 4, Credit 4 (W)

NETM-333             Strength of Materials
Registration #0811-333
This course introduces students to the reactions of engineering
materials to different types of loading. The course emphasizes the
use of standard handbooks, stress and strain relationships,
Poisson’s Ratio, safe loading, and expected deflection of beam-
and column-shaped machine parts. (NETM-332)
Class 3, Lab 3, Credit 4 (S)

NETM-334             Electromechanical Systems
Registration #0811-334
This course emphasizes the interface between microprocessors
and electromechanical devices. Students work on projects that in-
clude circuit design, software design, breadboarding skills, and
troubleshooting techniques. (NETM-328)
Class 3, Lab 3, Credit 4 (S)
NETM-368  Electronics I  
Registration #0811-368  
This course introduces students to basic diode and transistor circuits. Students learn about semiconductor theory, diode circuits, bipolar transistors, transistor biasing circuits, and AC signal amplifiers. Students develop basic measurement and breadboarding skills. (NETM-304)  
Class 3, Lab 6, Credit 4 (W)

NETM-369  Electronics II  
Registration #0811-369  
This course introduces students to FET and linear amplifiers and their characteristics. Topics of study include FET transistor AC-equivalent circuits, small signal amplifiers, power amplifiers, and push-pull amplifiers. Students develop basic measurement and breadboarding skills. (NETM-368)  
Class 3, Lab 6, Credit 5 (S)

NETM-370  Electronics III  
Registration #0811-370  
This course introduces students to the theory and application of communications circuits. Students learn about regulator characteristics and applications, control circuits, and a variety of linear integrated circuits. Students are required to use manufacturers' data sheets and to develop proper breadboarding skills. (NETM-369)  
Class 3, Lab 4, Credit 4 (F)

NETM-399  Independent Study  
Registration #0811-399  
Credit Variable

Industrial Drafting Technology

NETI-100  Career Exploration: Industrial Drafting  
Registration #0810-100  
This course provides students with information regarding a career in industrial drafting. Activities may include field trips, hands-on experiences, career information presentations, and interaction with graduates of the program and professionals in the field. These experiences help students understand work activities, conditions, and settings.  
Lab 3, Credit 1 (F, W, S)

NETI-103  Introduction to Computer-Aided Drafting (CAD)  
Registration #0810-103  
This is an introductory course in which students acquire basic competency in computer-aided drafting (CAD). Students create basic computer drawings, add dimensions and lettering, and learn some of the most useful commands of the software. They also have an opportunity to work on special applications.  
Class 1, Lab 3, Credit 2 (F, W, S)

NETI-131,132  Manufacturing Processes I, II  
Registration #0810-131,132  
Students are exposed to various traditional and non-traditional manufacturing operations. Students develop an appreciation for tolerancing of manufactured parts. (NTMM-152 for NETI-131; NETI-131 for NETI-132)  
Lab 3, Credit 1 (NETI-131, F; NETI-132, W)

NETI-141  Basic Technical Drafting I  
Registration #0810-141  
Students learn basic engineering drawing skills through instruction as well as manual and CAD drafting projects. Students are introduced to the use of tools and equipment, lettering, geometric constructions, measurement, sketching and shape description, multiview drawings, and basic dimensioning practices. (NTMM-142)  
Class 1, Lab 6, Credit 3 (F)

NETI-142  Basic Technical Drafting II  
Registration #0810-142  
Students continue to practice basic drafting concepts learned in the previous course. New topics include developments, intersections, sections, auxiliary views, and basic tolerancing. Students produce industrial-quality drawings. (NETI-141)  
Class 1, Lab 6, Credit 3 (W)

NETI-143  Basic Technical Drafting III  
Registration #0810-143  
Students continue to develop skills necessary to produce industrial-quality drawings. Major topics of this course include production drawings, tolerance limits and fits, threads and fasteners, surfaces, finishes, material specification, and preparation of an engineering notebook. (NETI-142)  
Class 1, Lab 6, Credit 3 (S)

NETI-151  Materials and Processes I  
Registration #0810-151  
Students examine the nature of materials, including structure, classification, and properties of materials as well as the processes used to transform raw materials into manufactured products. Students learn to identify, select, and specify engineering materials and processes for design. (NTSP-156)  
Class 3, Credit 3 (F)

NETI-152  Materials and Processes II  
Registration #0810-152  
Students continue to learn the structure, classification, properties, and processes of engineering materials while practicing identification, selection, and specification methods. (NETI-151)  
Class 3, Credit 3 (W)

NETI-204  Technical Drafting IV  
Registration #0810-204  
Students design welded structures from realistic engineering requirements. They work in the laboratory to produce a team-based welding assembly and supporting detail drawings. (NETI-203)  
Lab 8, Credit 3 (F)

NETI-205  Technical Drafting V  
Registration #0810-205  
Students solve a complex design problem from realistic engineering data, applying knowledge of power transmission components and mechanisms. This laboratory course creates a concept layout supported by engineering data. (NETI-204)  
Lab 9, Credit 3 (W)

NETI-206  Technical Drafting VI: Seminar Project  
Registration #0810-206  
Students design a working layout of a complex power transmission problem based on an engineering concept layout. This laboratory course provides a fully documented layout suitable for drafters to draw all individual parts. (NETI-205)  
Lab 15, Credit 5 (S)
NETI-213 Statics
Registration #0810-213
Students learn the basic principles of statics, including reactants and equilibrium of force systems, trusses containing two-force members, structures containing three-force members, centroids, moments of inertia, and dry friction. (NTMM-202, NTSP-135)
Class 6, Credit 5 (F)

NETI-214 Strength of Materials
Registration #0810-214
Students learn the basic concepts of strength of materials, including stress and strain analysis, both elastic and plastic, with emphasis on elastic analysis of axially loaded members, connectors, beams, and columns. The laboratory experience includes testing of materials utilizing appropriate machines. Field trips to see test demonstrations also occur. (Corequisite: NETI-221) (NETI-213)
Class 3, Lab 3, Credit 5 (W)

NETI-215 Mechanisms
Registration #0810-215
Students learn about basic mechanical components such as linkages and levers, and combinations of these devices as they are applied in machines. Analysis of force, deflection, velocity, and acceleration is stressed. The laboratory experience includes mathematical and graphical solutions of problems. (NTMM-202)
Class 3, Lab 4, Credit 4 (F)

NETI-221 Machine Design I
Registration #0810-221
This is a study of the analytical design of bearings, clutches, couplings, brakes, springs, gearing systems, and power shifting. (Corequisite: NETI-214) (NETI-213)
Class 3, Lab 3, Credit 4 (W)

NETI-222 Machine Design II
Registration #0810-222
Students learn methods of constructing machine parts as well as specifications of materials and manufacturing processes. (NETI-221)
Class 3, Lab 3, Credit 4 (S)

NETI-230 General Tolerancing
Registration #0810-230
This introductory course provides instruction in the principles of dimensioning and tolerancing. The course is designed to provide students with basic skills for recognizing, understanding, calculating, and applying different tolerance systems to individual and mating parts. These tolerance systems conform to industrial standards and practices and to the American National Standards Institute document *Dimensioning and Tolerance* (ANSI Y 14.5M-1982).
Class 2, Lab 6, Credit 3 (S)

NETI-231 Geometric Tolerancing I
Registration #0810-231
This is the first of two sequential courses that introduce students to geometric dimensioning and tolerancing. The course is designed to give students an overview of geometric symbols and how the assigned symbols indicate the shape and features of a part or object in relation to size. Tolerancing is applied in theory only, and the rules are presented to students to facilitate the concepts of geometric characteristic symbols per the American National Standards Institute (ANSI Y 14.5M-1982).
Class 2, Lab 1, Credit 2 (W)

NETI-232 Geometric Tolerancing II
Registration #0810-232
This is the second of two sequential courses that introduce students to geometric dimensioning and tolerancing. Students continue their study of a pictorial language that fosters uniform understanding among design, production, and inspection groups.
Class 2, Lab 1, Credit 2 (S)

NETI-241 Technical Mechanical Drafting I
Registration #0810-241
This is the first of three sequential courses that simulate an industrial drafting team project. Topics, taught in a lecture and laboratory format, include drawing and layout procedures, drawing media, basic drafting skills, basic dimensioning, circular dimensioning, common dimensioning, dimensioning methods, limits and tolerances, fits and allowances, working drawings, and assembly drawings. Students develop additional skills in manual and CAD drafting.
Class 2, Lab 6, Credit 3 (F)

NETI-242 Technical Mechanical Drafting II
Registration #0810-242
This is the second of three sequential courses that simulate an industrial drafting team project. Topics, to be taught in a lecture and laboratory format, include surface texture; detail, assembly, subassembly, and purchased-part drawings; engineering change notices; sections and conventions; and threaded fasteners. Students develop additional skills by producing drawings using manual and CAD formats.
Class 2, Lab 6, Credit 3 (W)

NETI-243 Technical Mechanical Drafting III
Registration #0810-243
This is the third of three sequential courses that simulate an industrial drafting team project. Topics, taught in a lecture and laboratory format, include working drawings, engineering change notices, purchased-part drawings, threaded fasteners, miscellaneous fasteners, forming processes, dies, and stamping and manufacturing materials. Students develop advanced skills by producing drawings using manual and CAD formats.
Class 2, Lab 6, Credit 3 (S)

NETI-251 Technical Electrical Drafting I
Registration #0810-251
This course is the first in a three-course sequence and is designed to provide students with the necessary skills to identify, draw, and differentiate between various electronics components. Topics include graphic symbols, reference designations, color code systems components, schematic diagrams, and control drawings. Students develop skills in manual and computer-assisted drafting.
Class 2, Lab 6, Credit 3 (F)

NETI-252 Technical Electrical Drafting II
Registration #0810-252
This is the second in a three-course sequence and is designed to provide students with the necessary skills to identify, draw, and differentiate between various electronics components. Topics include reference designation systems; block, logical, connection, interconnection, cable, and industrial electronics diagrams; and wiring harnesses. Students develop their skills in manual and computer-assisted drafting.
Class 2, Lab 6, Credit 3 (W)
This course provides students with information regarding a career in computer-assisted machining. Activities include field trips, career information, and instructional demonstrations. Hands-on experiences include the fundamentals of cutting tools, programming for part making, and demonstrations of machine tools. (NETT-135)

Class 1, Lab 2, Credit 2 (S)

NETN-152 Numerical Control II
Registration #0812-152
Students use on-line computers to prepare and verify programs. Students are introduced to advanced concepts through computer numerical control programming of a CNC milling machine. (NETN-151)

Class 4, Lab 3, Credit 4 (S)

NETN-253 Numerical Control III
Registration #0812-253
This course introduces students to computer numerical control. Topics covered include programming, set-up, and operation of machining and turning centers with industrial applications. Programming with manual data input, basic graphics, and machine language is emphasized. Safety is stressed throughout the course. (NETN-152)

Class 4, Lab 3, Credit 4 (S)

NETT-100 Career Exploration: Manufacturing Processes
Registration #0813-100
This course provides students with information regarding a career in manufacturing processes. Activities may include field trips, hands-on experiences, career information presentations, and interaction with graduates of the program and professionals in the field. These experiences help students understand work activities, conditions, and settings.

Lab 3, Credit 1 (F, W, S)

NETT-101 Basic Drafting I
Registration #0813-101
This course provides instruction in the principles and techniques of basic drafting for students in other technical programs. The emphasis is on understanding how drawings are made and used in industry. (NTMM-142)

Lab 6, Credit 2 (F)

NETT-102 Basic Drafting II
Registration #0813-102
This course is a continuation of Basic Drafting I and is designed for students who desire or need greater depth of knowledge of drafting in industry. Topics include auxiliary views, sections, applied mathematics, and isometric and pictorial drawings with greater attention to drawing quality. (NETT-101, NTMM-150)

Lab 6, Credit 2 (W)

NETT-131,132,133 Manufacturing Processes
Registration #0813-121,122,133 I, II, III
Students develop the basic skills necessary to use traditional machine tools. Laboratory instruction simulates an industrial environment. Emphasis on safety in the operation of machines is an integral part of the courses. (NTMM-140 for NETT-131; NETT-131 for NETT-132; NETT-132 for NETT-133)

Class 1, Lab 8, Credit 4 (NETT-131, F; NETT-132, W; NETT-133, S)

NETT-134,135,136 Manufacturing Processes
Registration #0813-134,135,136 IV, V, VI
Students apply the theory associated with the set-up and operation of lathes, milling machines, drill presses, grinders, and bench operations. Students also are introduced to non-traditional machining. Greater emphasis is placed on accuracy and tolerance of machine parts. Safety is stressed throughout all courses. (NETT-133 for NETT-134; NETT-134 for NETT-135; NETT-135 for NETT-136)

Class 1, Lab 8, Credit 4 (NETT-134, F; NETT-135, W; NETT-133, S)

NETT-139,140 Blueprint Reading I, II
Registration #0813-139,140
Students develop the skills necessary to read and interpret prints of engineering drawings of details and assemblies. (NTMM-141 for NETT-139; NETT-139 for NETT-140)

Class 1, Lab 3, Credit 2 (NETT-139, F; NETT-140, W)

NETT-151 Industrial Materials
Registration #0813-151
This course introduces students 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. (NETT-134)

Class 3, Credit 3 (W)

NETT-152 Manufacturing Analysis
Registration #0813-152
This course introduces students to manufacturing concepts. Students learn about production, management, and sales. The text and class discussions focus on problem solving and industrial operations. (NETT-134)

Class 3, Credit 3 (S)
NETT-153 Welding I
Registration #0813-153
Students learn about basic oxyacetylene and shielded metal arc welding processes as well as how to set up and operate equipment properly. Safety rules pertaining to welding are emphasized. (NETT-134)
Lab 4, Credit 2 (W)

NETT-154 Precision Measurement
Registration #0813-154
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. (NETT-132)
Class 1, Lab 3, Credit 2 (S)

NETT-155 Welding II
Registration #0813-155
Students develop skills in gas tungsten arc welding, gas metal arc welding, and resistance welding. The course emphasizes proper operation of equipment and related safety measures. (NETT-153)
Lab 4, Credit 2 (S)

NETT-237 Advanced Machining and Processes
Registration #0813-237
This course introduces students to advanced-level machining and non-traditional processes. Students develop additional skills in tool-room grinding and are introduced to electrocharge machining and heat treatment of steels. Safety is stressed throughout the course. (NETT-136)
Class 1, Lab 8, Credit 4 (F)

NETT-256 Advanced Precision Measurement
Registration #0813-256
This course introduces students to advanced-level precision measuring equipment and methods of operation. Students develop additional skills in the use of optical and computer-programmed measuring equipment. (NETT-136)
Class 2, Lab 2, Credit 3 (W)

NETT-260 Senior Seminar
Registration #0813-260
This course provides exiting manufacturing processes students with a structured forum for discussions with program faculty members about employee relations and ethics, industrial employment trends, apprentice programs, and continued technical skills development. (NETT-136)
Class 2, Credit 1 (S)

NETT-299 Co-op Work Experience
Registration #0813-299
Credit 0 (Su)

NETT-399 Independent Study
Registration #0813-399
Credit Variable
This is a continuation of MLT Chemistry II. This part of the chemistry program lays the foundation for the relationship between chemistry and living organisms. Topics include the amines, carbohydrates, and lipids as well as amino acids and proteins. Description of the structure and function of nucleic acids, vitamins, and hormones bring together the interrelationships of biochemical reactions. Laboratory procedures include preparation, identification, and qualitative tests for the amines, amides, carbohydrates, triglycerides, and amino acids. Preparation and examination of aspirin, nylon, and soaps, and analysis of a peanut conclude this portion of the course. If time permits, students may explore instrumental analysis involving use of spectrophotometers and gas chromatography. (NTSC-116)

This course is for students enrolled in programs requiring review or preparation for College of Science chemistry courses. The course includes principles of measurement, composition of matter, energy changes, behavior of gases, atomic structure, and bonding. Laboratory work includes experiments related to topics covered. (Math completion or concurrent registration in NTMM-152)

This course provides an introduction to quantitative analysis of spectrophotometers and gas chromatography. (NTSC-116)

This course is an introduction to the study of microscopic organisms such as viruses, bacteria, yeasts, protozoa, fungi, and algae. The course also includes clinical procedures for the study of common disease-causing organisms with concentration in bacteriology. Techniques in the laboratory include media preparation, sterilization, culturing, mounting, staining, agglutination, antimicrobial susceptibility testing, and biochemical reactions. (NTSL-122)
NTSL-133  Blood Banking
Registration #0816-133
The theory of blood banking and routine procedures is presented in this course. Emphasis is placed on quality control, ABO grouping, sub-grouping, Rh testing, antiglobulin testing, antibody screening, antibody detection and identification, transfusion reactions, compatibility testing, erythroblastosis fetalis, preparation and storage of blood components, and recordkeeping.
Class 2, Lab 3, Credit 3 (S)

NTSL-140  Electron Microscopy
Registration #0816-140
Electron optics and the mechanics of the electron microscope are studied prior to any work on the electron microscope. The principles of specimen preparation, fixation, embedding, micrometry, staining, and photographic processing are studied in depth. The course grade is based on the quality of final products. (NTSB-109, NTSL-111)
Class 2, Lab 5, Credit 3 (F, W, S)

NTSL-200  MLT Co-op Seminar
Registration #0816-200
This course provides students with knowledge and skills to prepare them for a successful co-op experience, including guidelines on professional ethics, employee-employer responsibilities, communication skills, and interpersonal relationship development. Class activities include discussion groups, panel presentations, hospital visitations, lectures, and the preparation of co-op materials. (Completed first year in program)
Class 2, Credit 1 (W)

NTSL-201,202,203  Clinical Chemistry I, II, III
Registration #0816-201,202,203
This three-quarter sequence provides theory and practice in the quantitative and qualitative analyses of physiochemical parameters. The sequence includes fundamental concepts of clinical analysis, theory and practical application of clinical instrumentation, and the relationship of clinical analysis to methodology, disease, and the diagnostic process. The winter and spring quarters include a hospital affiliation in clinical instrumentation twice weekly. (NTSL-201 for NTSL-202; NTSL-202 for NTSL-203)
Class 12, Credit 6 (NTSL-201, F)
Class 9, Credit 5 (NTSL-202, W; NTSL-203, S)

NTSL-211  Histology II
Registration #0816-211
This course is a continuation of Basic Histology with emphasis on histochemistry, special stains, and tissue preparation techniques. (NTSL-111)
Class 12, Credit 6 (W, S)

NTSL-224  Laboratory Simulation
Registration #0816-224
This course is a review and summary of all specialties included in the total medical laboratory technology program. Students rotate into all departments in the clinical laboratory environment. Students meet one hour per week with medical laboratory technology faculty members on campus. The remaining 12 hours each week are spent on rotation in an affiliated hospital or clinical laboratory under supervised conditions.
Class 1, Lab 6, Credit 3 (S)

NTSL-232  Microbiology II
Registration #0816-232
This course is an in-depth study of medical bacteriology and the related diseases. Theory and practice are provided in specimen collection, culturing, staining, media preparation and selection, normal flora, identification procedures for disease-producing organisms, susceptibility testing, agglutination reactions, and reporting results. (NTSL-131)
Class 12, Credit 6 (F)

NTSL-233  Microbiology III
Registration #0816-233
This course is a continuation of Microbiology II, with an emphasis on special techniques for anaerobic organisms, mycobacteriology, mycology, and virology. The theory portion of the course includes the study of diseases and their symptoms. This course takes place on campus and in affiliated hospital laboratories. (NTSL-232)
Class 9, Credit 5 (W)

NTSL-299  Co-op Clinical Experience
Registration #0816-299
Credit 0 (Su)

NTSL-399  Independent Study
Registration #0816-399
Credit Variable

Medical Record Technology

NTSR-100  Career Exploration: Medical Record Technology
Registration #0819-100
This course provides a general overview of experiences related to the medical record profession. It is offered to students who want to explore their interest in selecting medical record technology as a career. Students enrolled in the course typically have not attended the Summer Vestibule Program (SVP) or attended SVP but did not sample medical record technology at that time.
Class 2, Credit 1 (S)

NTSR-106  Biology I
Registration #0819-106
This is the first in a three-quarter series of courses. Topics covered in this course are basic atomic structure, molecular biology, cellular structure and function, cellular respiration, DNA structure, protein synthesis, mitosis, and the relationship of bacteria and viruses to disease. Laboratory activities involving microscopic and macroscopic observations of prepared and live specimens are performed to supplement classroom lectures and discussion. Study skills development and refinement are emphasized.
Class 4, Lab 2, Credit 4 (F)

NTSR-107  Biology II
Registration #0819-107
This course concentrates on human biology. Topics covered include hematology and the digestive, excretory, cardiovascular, respiratory, immune, and nervous systems. Laboratory activities, including the use of prepared specimens, supplement classroom lectures and discussion. Medical terminology is introduced through discussion of exemplary pathological conditions. (NTSR-106)
Class 4, Lab 2, Credit 4 (W)
The final course in this sequence continues to focus on human biology. Topics covered are the endocrine system, reproduction, embryology, meiosis, and cellular and human genetics. Basic medical terminology related to each topic is discussed. Laboratory activities include dissecting a pig embryo as well as reviewing the anatomy of all body systems studied in this course and Biology II. (NTSR-107)

This two-quarter, in-depth study of human anatomy and physiology using a systematic approach to basic disease processes. Emphasis is placed on related medical terminology and clinical-procedures. (NTSR-111 for NTSR-112)

NTSR-141 Medical Record Science I
Registration #0819-141
The career in medical record technology is introduced through discussion and laboratory practice. Topics covered are the medical record content and record numbering and filing systems. Procedures in the laboratory include filing, admissions, chart assembly and analysis, and chart deficiencies.

This unit uses the content of patient records to continue the practical experience in manual and automated coding. Students learn manual and computerized abstracting of statistical data as well as how to compute and interpret health statistics; they also learn to interpret computerized statistical reports. (NTSR-142)

This course gives an overall introduction to health care delivery systems. It includes the composition, responsibilities, and functions of the administrative staff, health care providers, and allied health departments and professionals. Students discuss the purposes of and responsibility for the health record.

These are the first three courses in a five-quarter sequence. Etymology, definition, pronunciation, spelling, and correct utilization of medical terms are reinforced. (NTSR-161)

In this course, terms related to disorders, diagnosis, treatment, and surgical procedures are selected from a variety of specialty topics. These topics include aging, microbiology, oncology, pathology, pharmacology, psychiatry, radiology, nuclear medicine, and radiation therapy. Etymology, definition, spelling, pronunciation, and correct utilization of medical terms are reinforced. (NTSR-264)

This two-quarter sequence combines knowledge of human physiology with disease processes. The etiology, pathological mechanisms, characteristic symptoms, clinical manifestations, and diagnostic and therapeutic procedures of common diseases are presented. (NTSR-112 or equivalent for NTSR-251; NTSR-251 for NTSR-252)

This course includes management, supervision, and personnel administration as well as quality assurance. (NTSR-243)

This course emphasizes a continuation of sampling in optical finishing technology, including an overview of the career, admissions and graduate requirements, sources of employment, and expectations of students in the program. Students learn the titles, roles, and responsibilities of vision care personnel, including the M.D., O.D., dispensing optician, and optical finishing technologist. Laws and regulations governing the ophthalmic laboratory industry are introduced.

This course includes clinical affiliations in nursing facilities, ambulatory care, mental health care, and home care. In addition, quality assurance for health care insurance claims and coding HMO claims in various local facilities are covered as well as legal aspects of health records. (NTSR-245)

This course includes coding rules and laboratory experience in practical application of coding diseases and operations. (NTSR-141)

This two-quarter course, supplemented by secondary vocabulary selected from the same topics. Etymology, definition, spelling, pronunciation, and correct utilization of medical terms are reinforced. (NTSR-163)

This course includes management, supervision, and personnel administration as well as quality assurance. (NTSR-243)

This two-quarter sequence combines knowledge of human physiology with disease processes. The etiology, pathological mechanisms, characteristic symptoms, clinical manifestations, and diagnostic and therapeutic procedures of common diseases are presented. (NTSR-112 or equivalent for NTSR-251; NTSR-251 for NTSR-252)

This is a review of terms encountered in Medical Terminology I, II, and III supplemented by secondary vocabulary selected from the same topics. Etymology, definition, spelling, pronunciation, and correct utilization of medical terms are reinforced. (NTSR-163)

This course includes management, supervision, and personnel administration as well as quality assurance. (NTSR-243)

This course includes practical experience in manual and automated coding. Students learn manual and computerized abstracting of statistical data as well as how to compute and interpret health statistics; they also learn to interpret computerized statistical reports. (NTSR-142)

This course gives an overall introduction to health care delivery systems. It includes the composition, responsibilities, and functions of the administrative staff, health care providers, and allied health departments and professionals. Students discuss the purposes of and responsibility for the health record.

This course includes management, supervision, and personnel administration as well as quality assurance. (NTSR-243)

This is a review of terms encountered in Medical Terminology I, II, and III supplemented by secondary vocabulary selected from the same topics. Etymology, definition, spelling, pronunciation, and correct utilization of medical terms are reinforced. (NTSR-163)

This course gives an overall introduction to health care delivery systems. It includes the composition, responsibilities, and functions of the administrative staff, health care providers, and allied health departments and professionals. Students discuss the purposes of and responsibility for the health record.

This course includes management, supervision, and personnel administration as well as quality assurance. (NTSR-243)
NTSF-106 Introduction to Optical Finishing Technology II
Registration #0827-106
This course teaches the function and use of optical laboratory equipment necessary to the production of single-vision eyewear. Students learn the basic concepts of sphere, cylinder, axis, and geometric center as well as how to fabricate single-vision uncut lenses into finished eyewear.
Class 2, Credit 2 (W)

NTSF-107 Introduction to Optical Finishing Technology III
Registration #0827-107
This course introduces the concept of writing functions of given vertometer parts. Students learn the process of writing step-by-step sequential procedures for equipment operation. They practice determining lens powers from vertometer readings and calculating decentration from given prescription information. They also learn the meanings of various optical terms found on prescription forms. (NTSF-106)
Class 2, Credit 2 (S)

NTSF-111 Optical Finishing Technology Math I
Registration #0827-111
This course focuses on the rules of transposition, including transposition of lens powers. Students learn to apply mathematic functions, solving for binocular and monocular RD.s, near-vision prescriptions, and bifocal segment height and inset. The concepts of plus and minus cylinder prescription powers are discussed, and definitions and determinations of lens powers from given base curves, cross curves, and inside curves are taught. (NTMM-140)
Class 4, Credit 3 (F)

NTSF-112 Optical Finishing Technology Math II
Registration #0827-112
This course teaches students how to select and determine appropriate base curves, cross curves, and inside curves of given lens powers. Students learn mathematic formulas used in determining effective diameter, smallest lens blank, and prism. They also learn to apply mathematic functions related to vertometer power readings, heat treat times, and lens measurer readings. (NTMM-140, 141; NTSF-111)
Class 4, Credit 3 (W)

NTSF-115 Prescription Analysis I
Registration #0827-115
This course teaches students the meaning of various optical terms found on prescription forms. Students learn what information should be on a complete prescription and how to analyze single-vision and multifocal prescriptions for laboratory processing.
Class 4, Credit 3 (F)

NTSF-116 Prescription Analysis II
Registration #0827-116
Students continue to analyze and write ophthalmic prescriptions in various forms with an emphasis on ortholite plastic, cataract, and trifocal prescriptions. (NTSF-115)
Class 4, Credit 3 (W)

NTSF-117 Lens Design
Registration #0827-117
This course teaches students how to design lens systems based on specific optical factors such as frame selection, lens material, lens thickness, index of refraction, size of lens, lens power, blank manufacturer, and cosmetic appeal. Students learn trade names of lenses, percentages of lens transmission, multifocal segment placement, and occupational and recreational lens forms. (NTSF-111, 112)
Class 5, Credit 3 (S)

NTSF-121 Optical Finishing Techniques I
Registration #0827-121
This course teaches students the techniques of using the vertometer, layout marker, heat treat units, and pattern maker, automatic edging machines, and development of hand-beveling skills. (NTSF-112, 116, 162)
Class 6, Credit 5 (W)

NTSF-122 Optical Finishing Techniques II
Registration #0827-122
This course teaches students how to block and edge lenses using a variety of automatic edging machines. Students learn how to edge given lenses with a Vee bevel, rimless bevel, and hide-a-bevel. Edging concepts and operational techniques are emphasized. (NTSF-121)
Class 6, Credit 5 (S)

NTSF-123 Optical Finishing Techniques III
Registration #0827-123
This course teaches students the use of the vertometer and various layout markers to prepare lenses for edging. Students learn to process uncut ophthalmic lenses according to ANSI standards. (NTSF-122)
Class 12, Credit 6 (S)

NTSF-161 Optical Finishing Terminology I
Registration #0827-161
This course emphasizes comprehension, spelling, and application of terminology related to the optical profession, including the laboratory environment, function and disorders of the eye, and optics/lens characteristics.
Class 5, Credit 3 (F, W, S)

NTSF-162 Optical Finishing Terminology II
Registration #0827-162
This course emphasizes the comprehension, spelling, and application of terminology related to the vertometer, lensometer, pattern maker, heat treat units, and ceramic and diamond head beveling wheels. (NTSF-161)
Class 5, Credit 3 (F, W, S)

NTSF-163 Optical Finishing Terminology III
Registration #0827-163
This course emphasizes the comprehension, spelling, and application of terminology related to lens tolerances, functions, procedures, operation and troubleshooting of selected auto edge machines, layout markers, and blocking systems. Students complete a paper describing the procedures used in making prescription eyeglasses. (NTSF-162)
Class 5, Credit 3 (F, W, S)

NTSF-224 Optical Finishing Techniques IV
Registration #0827-224
Concepts taught in Optical Finishing Techniques III are further developed, with an emphasis on layout techniques, including multifocal and specialized vocational lens systems. Students learn to identify metal frame types by manufacturer. Procedures for lens insertion, frame alignment, and proper use of assembly-alignment tools are emphasized. (NTSF-123)
Class 9, Credit 5 (F)
NTSF-225  Optical Finishing Laboratory
Registration #0827-225 Simulation I
This course provides practice in the total processing of actual eyeglass prescriptions from uncut stage through completion and final inspection. Students practice various methods of assembling lenses into plastic (Zylonite) frames, symmetrical alignment of the finished product, and repair and restoration techniques for damaged or distorted plastic frames. Students assume the duties of supervisors and rotate positions to demonstrate competence in all phases of operation.
Class 9, Credit 5 (W)

NTSF-226  Optical Finishing Laboratory
Registration #0827-226 Simulation II
This course teaches the techniques of rimless mounting, notching, drilling, grooving, frame repair (soldering), lens dyeing, and the use of the spectrometer. Students select frame and lenses for layout and processing to finished product. (NTSF-225)
Class 9, Credit 5 (S)

NTSF-241  Management of Optical Stockroom Procedures
Registration #0827-241
In this course, students learn to identify the function and job responsibilities of stockroom personnel, suppliers of laboratory products, consumers (customers) of laboratory products, and flow of operations. Emphasis is on basic ophthalmic frames, receipt of orders, picking stock, stock check-in, and related administrative procedures.
Class 6, Credit 4 (F)

NTSF-243  Optical Finishing Inspection and Correction
Registration #0827-243
Students evaluate finished prescription orders as final inspectors, comparing all optical and mechanical details with written specifications. Emphasis is placed on accuracy, quality of workmanship, and the inspector's ability to recommend and produce any changes that may be necessary. Study includes learning acceptable ANSI tolerance levels and prism beveling.
Class 5, Credit 3 (S)

NTSF-251  Professional Optic Seminar
Registration #0827-251
In this seminar, professionals from Rochester's ophthalmic community discuss their roles in the complex field of visual care. They offer valuable background information on the many kinds of services, instrumentation techniques, and technologies that comprise the unending efforts to maintain and improve the quality of visual acuity.
Class 2, Credit 2 (W)

NTSF-299  Co-op Work Experience
Registration #0827-299 (NTSF-101)
Credit 0 (Su)

NTSF-399  Independent Study
Registration #0827-399
Credit Variable

NTMM-120  Introduction to College Mathematics
Registration #0817-120
This course improves students' fundamental skills in mathematics. Topics covered emphasize the use of language as it relates to basic mathematical computations. The use of calculators is stressed.
Class 3, Credit 3 (F)

NTMM-140  Fundamentals of College Mathematics I
Registration #0817-140
This course is an introduction to the application of mathematics as a problem-solving tool. Emphasis is placed on measurement, use of proportion, approach to verbally expressed problems, and computation with and without a calculator. Elementary topics from geometry and statistics are included. (NTMM-120 or approval of the offering department)
Class 5, Credit 3 (F, W)

NTMM-141  Fundamentals of College Mathematics II
Registration #0817-141
This course deals with the application of the basic tools of algebra, geometry, and trigonometry as solutions to problems. The course deals with the concepts of an algebraic variable as well as techniques for solving simple equations and inequalities. Simple applications of geometric principles are taught as well as elementary applications of right-angle trigonometry. Attention also is paid to graphic display of data. (NTMM-140 or approval of the offering department)
Class 5, Credit 3 (W, S)

NTMM-142  Fundamentals of College Mathematics III
Registration #0817-142
This course deals with the application of a variety of algebraic and geometric techniques to problem solving. Emphasis is placed on the concepts of function and relation and on graphing linear relations. Concepts of area and volume, powers and radicals, and geometry on the coordinate plane are included as well as an introduction to the use of vectors. (NTMM-141 or approval of the offering department)
Class 5, Credit 3 (F, S)

NTMM-150  Integrated College Mathematics I
Registration #0817-150
Topics from algebra, geometry, trigonometry, and other areas of mathematics are explored. Relations, functions, geometric loci, loci on the coordinate plane, algebraic functions, graphing, and right-angle trigonometry are studied. Calculators are used extensively as aids in problem solving. (NTMM-142 or approval of the offering department)
Class 5, Credit 4 (F, W)

NTMM-151  Integrated College Mathematics II
Registration #0817-151
Additional topics from algebra, geometry, trigonometry, and other areas of mathematics, including statistical concepts, are explored. Inequalities, graphing, polynomial and rational functions, geometry of the circle, trigonometric identities, measurement error, fractional exponents, and exponential functions are studied. Calculators are used extensively as aids in problem solving. (NTMM-150 or approval of the offering department)
Class 5, Credit 4 (W, S)
NTMM-152 Integrated College Mathematics III
Registration #0817-152
Additional topics from algebra, geometry, trigonometry, and other areas of mathematics, including concepts from formal logic, are explored. Inverse relations, logarithms, truth statements, constructions, congruence, introduction to formal mathematical proofs, areas of geometric figures, law of sines, law of cosines, vectors, and complex numbers are studied. Calculators are used extensively as aids in problem solving. (NTMM-151 or approval of the offering department)
Class 5, Credit 4 (F, S)

NTMM-163 Mathematics for Data Processing
Registration #0817-163
This course provides basic mathematical skills relevant to the field of data processing. The course emphasizes arithmetic operations in various number systems and logical formulation of problems.
Class 3, Credit 3 (F, W, S)

NTMM-170 Medical Laboratory Mathematics
Registration #0817-170
This course provides mathematical skills that support medical laboratory procedures. Topics include use and application of electronic calculators in determining routine laboratory results; conversions of measurement systems; calculations of molarity, normality, and percentage strengths of solutions; applications of routine statistical calculations; and fundamental mathematical calculations used in urinalysis, hematology, and clinical chemistry.
Class 3, Credit 3 (S)

NTMM-210 Advanced Mathematics I
Registration #0817-210
Advanced topics from pre-calculus mathematics are studied with an emphasis on functions and graphs. A graphing calculator is used to facilitate exploration of mathematical concepts. Linear and quadratic functions are explored in depth, and the properties of circular functions are developed. An introduction to formal study of the real number system is included.
Class 4, Credit 3 (F, W)

NTMM-211 Advanced Mathematics II
Registration #0817-211
Linear structures and advanced topics from trigonometry and pre-calculus are explored. Vectors, matrices and complex numbers, transformations, trigonometric identities, inverse trigonometric functions, and polar graphing are studied. A graphing calculator is used to explore mathematical concepts and to demonstrate applications of technology to problem solving in mathematics.
Class 4, Credit 3 (W, S)

NTMM-212 Concepts of Calculus
Registration #0817-212
Topics traditionally covered in a first calculus course are explored. Sequences and series, limits, continuity, and derived function are studied. A graphing calculator is used extensively to develop concepts and to aid in problem solving.
Class 4, Credit 3 (F, S)

Technical Physics

NTSP-168 Optical Finishing Physics
Registration #0818-168
This course involves the study of light, reflection, and refraction. These principles are applied to the study of the behavior of spherical and piano mirrors, prisms, and lenses. The usefulness and application of dioptric power, the lensmaker's equation, image and object dimensions, and focal length measurements are addressed. Also included are basic optical instruments and a study of the electromagnetic spectrum. Emphasis is placed on geometrical (ray) optics. The course includes a comprehensive laboratory experience that supplements and closely follows classroom instruction. (NTMM-141)
Class 4, Lab 1, Credit 3 (W, S)

NTSP-201 Physics I
Registration #0818-201
Physics I is the first course in a series designed to provide a broad background in general physics. The course is required for students entering NTID engineering technology programs. 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, analysis of vectors, work, power, and mechanical energy.
Class 4, Credit 4 (F, W, S)

NTSP-202 Physics II
Registration #0818-202
Physics II is the second course in a series designed to provide a broad background in general physics. The course is required for students entering NTID engineering technology programs. Students are provided with hands-on laboratory experience in a supervised setting. Topics, which are presented in a lecture/lab format, include thermal energy, nature of light, reflection and refraction, static electricity, electric currents, series and parallel circuits, magnetic fields, and electromagnetic induction.
Class 4, Credit 4 (F, W, S)

NTSP-203 Advanced Topics in Mechanics
Registration #0818-203
This is the third physics course for students in NTID's construction technology program. Students are provided with hands-on laboratory experience in a supervised setting. Topics, which are presented in a lecture/lab format, include motion, equilibrium, strength of materials, fluid statics and dynamics, sound, elastic potential energy, and wave motion.
Class 4, Credit 4 (F, W, S)

NTSP-204 Advanced Topics in Electricity
Registration #0818-204
This is an elective course for students in all NTID engineering programs. The course is designed to provide a broad theoretical background in the physics of AC and DC electrical circuits. Students are provided with hands-on laboratory experience in a supervised setting.
Class 4, Credit 4 (S)

NTSP-399 Independent Study
Registration #0818-399
Credit Variable
School of Visual Communications

Applied Art and Computer Graphics

NDAR-100  Career Exploration: Art Registration #0849-100
This course is designed to help students collect the information necessary to make appropriate decisions about a possible career in the art field. Students have opportunities to explore their interests and skills in art through structured hands-on experiences with art tools and equipment. Emphasis is on increasing students' awareness of their art skills, applied art career options, working conditions, salaries, and job responsibilities.

Lab 2, Credit 1 (F, W, S)

NDAR-111,112,113  Basic Design I, II, III Registration #0849-111,112,113
This course sequence is an introduction to the concepts and elements of design as they relate to a vocation in applied art. Emphasis is on exploration and analysis of all design principles such as point, line, shape, texture, space, and color as they apply to two- and three-dimensional forms. (NDAR-100 for NDAR-111; NDAR-111 for NDAR-112; NDAR-112 for NDAR-113)

Lab 3, Credit 2 (F, W, S)

NDAR-121,122,123  Basic Drawing I, II, III Registration #0849-121,122,123
This is a fundamental course sequence that introduces students to various freehand drawing concepts, methods, and techniques. Emphasis is placed on eye-hand coordination, rendering techniques, one- and two-point perspective, and various drawing media. A variety of forms are used, including still life objects, architectural forms, and the human figure. (NDAR-100 for NDAR-121; NDAR-121 for NDAR-122; NDAR-122 for NDAR-123)

Lab 6, Credit 3 (F, W, S)

NDAR-141,142,143  Career Seminar I, II, III Registration #0849-141,142,143
This course sequence provides experience in the development of a personal career plan in art and assists with the development of college survival skills. Students explore personal interests, aptitudes, art program opportunities, and college adjustment issues through presentations, field trips, discussions, and research of art careers. This course sequence emphasizes systematic decision making related to art careers.

Class 2, Credit 1 (F, W, S)

NDAR-151,152  Computer Graphic Systems I, II Registration #0849-151,152
This course sequence is an introduction to computer graphics systems. Emphasis is placed on learning how to use hardware and software for generating images and type and for file management. Specific computer-related vocabulary also is covered. In this course, students have hands-on experience using various types of hardware and software. (NDAR-100 for NDAR-151; NDAR-151 for NDAR-152)

Lab 3, Credit 2 (F, W, S)

NDAR-161,162,163  Media and Processes I, II, III Registration #0849-161,162,163
The basic tools, materials, and equipment used in the professional applied art studio are introduced to students. Emphasis is placed on identification, vocabulary, maintenance, and correct use of media, mechanical tools, photostat equipment, and a variety of materials. (NDAR-100 for NDAR-161; NDAR-161 for NDAR-162; NDAR-162 for NDAR-163)

Lab 3, Credit 2 (F, W, S)

NDAR-231,232,233  Introduction to Typography Registration #0849-231,232,233
This sequence is a study of the use of typography in applied art: the origins of typographic form, type classifications, production processes, measurement systems, and type specification methods. Students gain experience in design, copy marking, planning formats, copyfitting, and using the computer as a composition tool. (NDAR-113, 123, 152, 163 for NDAR-231; NDAR-231 for NDAR-232; NDAR-232 for NDAR-233)

Lab 3, Credit 2 (F, W, S)

NDAR-241,242,243  Art Survey I, II, III Registration #0849-241,242,243
This course sequence offers a survey of major historical developments in the visual arts as they relate to applied art. Students are introduced to research methods used in the field of art as the basis for design concept development.

Class 2, Credit 2 (F, W, S)

NDAR-258  Applied Art Photography Registration #0849-258
This is an elective course in the use of photographic processes as they relate to the applied artist. Emphasis is on understanding and using the camera, black-and-white film processing, contact printing, and enlarging. Students practice darkroom procedures and methods for obtaining a basically well-crafted photographic image.

Class 4, Credit 2 (F, S)

NDAR-261,262,263  Traditional/Electronic Layout I, II, III Registration #0849-261,262,263
This course sequence applies design concepts, principles, and methods developed in first-year courses. Students learn how to use both electronic and traditional methods to develop design solutions and produce accurate comprehensive layouts. Students receive hands-on experience using computer hardware and software related to page layout. The course includes marker skills, creative problem solving and practices evident in a professional art studio. (NDAR-113, 123, 152, 163 for NDAR-261; NDAR-261 for NDAR-262; NDAR-262 for NDAR-263)

Lab 6, Credit 3 (F, W, S)

NDAR-267  Three-Dimensional Applications Registration #0849-267
This elective course extends basic concepts, principles, and methods as they apply to three-dimensional form. Emphasis is on material characteristics, tool/material processes, construction techniques, and basic model making.

Lab 3, Credit 2 (S)
NDAR-271, 272, 273  Production Methods I, II, III
Registration #0849-271, 272, 273
Emphasis is placed on understanding printing methods used to produce black-and-white and color artwork. The creation and preparation of artwork, including color separation, are taught using both traditional hand skills and computers. Specific vocabulary related to reproducing artwork also is covered. (NDAR-113, 123, 152, 163 for NDAR-271; NDAR-271 for NDAR-272; NDAR-272 for NDAR-273)
Lab 3, Credit 2 (F, W, S)

NDAR-277  Air Brush/Retouching
Registration #0849-277
This elective course provides basic experience with the air brush as a tool for original art, retouching, and illustration. Emphasis is on care and maintenance, dyes, paints, masks, working surfaces, and a variety of working techniques. (NDAR-112, NDAR-122, NDAR-162)
Class 3, Credit 2 (F, S)

NDAR-280  Computer Illustration Methods
Registration #0849-280
This course provides students with advanced skills in the area of computer illustration. In the course, students learn how to use the advanced functions of black-and-white and color graphic software to create professional-quality renderings for print publication. (NDAR-113, 123, 152, 163)
Lab 3, Credit 2 (F, W, S)

NDAR-284  Mechanical Perspective
Registration #0849-284
Students learn the use of mechanical drawing methods for visualizing three-dimensional form in perspective. Experiences in this elective course include orthographic projection and one- and two-point perspective based on forms ranging from simple geometric solids to complex patterns. Emphasis is on mastery of basic methods for constructing a technically accurate drawing. (NDAR-121)
Class 3, Credit 2 (W)

NDAR-285  Mechanical Drawing Methods
Registration #0849-285
Students are introduced to mechanical processes for depicting three-dimensional forms on a flat surface. This elective course includes drawing methods, such as oblique and isometric, based on simple and complex forms. Emphasis is on translating the three-dimensional form into a technically accurate drawing. (NDAR-284)
Class 3, Credit 2 (S)

NDAR-287  Drawing Applications
Registration #0849-287
This is an advanced elective course refining freehand and technical drawing concepts, methods, and techniques developed in Basic Drawing I, II, and III. Emphasis is on development of advanced drawing skills, using various types of subject matter, media, and processes. (NDAR-123)
Class 3, Credit 2 (F)

NDAR-294  Freehand Lettering
Registration #0849-294
Students are introduced to the basic processes of freehand lettering. The emphasis of this elective course is on identification, care, and use of various lettering tools such as carpenter's pencil, speedball pen, and lettering brush. Use of basic methods of stroking, letterspacing, word spacing, linespacing, and rendering of both serif and sans serif letterforms are taught. (NDAR-161)
Class 3, Credit 2 (W)

NDAR-295  Finished Lettering
Registration #0849-295
This elective course is an introduction to the processes, tools, equipment, and methods for producing finished lettering for reproduction. Included are exercises designed to develop skills in rendering script, serif, sans serif, and decorative letterforms. (NDAR-294)
Class 3, Credit 2 (S)

NDAR-311, 312  Graphic Applications I, II
Registration #0849-311, 312
This is an advanced course sequence stressing layout, mechanical, and computer skills within the context of a professional studio environment. The courses involve practical work experience, with an emphasis on studio procedures, work habits, professional skills, and dealing with clients as well as refinement of individual portfolios. (NDAR-233, 263, 273, 280 for NDAR-311; NDAR-311 for NDAR-312)
Lab 10, Credit 5 (F, W, S)

NDAR-321, 322, 323  Employment Seminar I, II, III
Registration #0849-321, 322, 323
Students are oriented to the total working/living environment of the professional applied art field, with an emphasis on processes for securing and maintaining employment. Experiences include resume preparation, interviewing techniques, guest lectures, field trips, presentations, discussions, and personally directed job-seeking. (NDAR-233, 263, 273, 280 for NDAR-321; NDAR-321 for NDAR-322; NDAR-322 for NDAR-323)
Class 3, Credit 3 (F, W, S)

NDAR-330  Graphic Applications/Portfolio Review
Registration #0849-330
This course is applied art students' final professional preparation course prior to graduation. It includes practical work experience, interaction with clients, and involvement with all phases of studio production, including layout, mechanicals, and computer graphics. As part of this course, students must submit a portfolio of artwork for final review by a jury composed of department faculty members and professional artists. (NDAR-312)
Lab 10, Credit 5 (F, W, S)

NDAR-399  Independent Study
Registration #0849-399
Credit Variable
Photo/Media Technologies

NVPP-100 Introduction to Photographic Printing
Registration #0851-100
This course explores the photo/media field to help students make well-informed decisions regarding their college area of specialization. Students have opportunities to explore their interest in the field through hands-on experiences with photo/media equipment and tools. Opportunities are provided for students to increase their awareness of necessary photo/media skills, industries, program, and expectations of the photo/media technologies department. Technical areas of study include color negative printing, computer graphics, special effects slides, storyboards from 35mm slides, and video equipment.
Lab 2, Credit 1 (W, S)

NVPP-101 Introduction to Cameras
Registration #0851-101
Students use and extend basic camera skills to meet the special needs of copy work. They use 35mm and 4x5 copy cameras with a variety of black-and-white and color film types and are introduced to special lighting and exposure techniques. (Grade of C or better in NVPP-101, 111, 121)
Lab 4, Credit 2 (F, W, S)

NVPP-102 Black-and-White Printing
Registration #0851-102
This course builds on previously learned basic printing skills. Students use a variety of negative sizes to develop more advanced skills in controlling print contrast and exposure. The making of a quality photographic print is emphasized. (Grade of C or better in NVPP-101, 111, 121)
Lab 4, Credit 2 (F, W, S)

NVPP-111 Introduction to Film Processing
Registration #0851-111
This course introduces and gives students practice techniques for processing and process control of black-and-white roll film. Emphasis is on consistency and high quality film processing through control of processing variables. (Corequisites: NVPP-101, 121)
Lab 3, Credit 2 (F, W, S)

NVPP-112 Film Processing
Registration #0851-112
This course extends the skills learned in Introduction to Film Processing. Various types and sizes of black-and-white films are used. Emphasis is placed on control and repeatability. (Grade of C or better in NVPP-101, 111, 121)
Lab 4, Credit 2 (F, W, S)

NVPP-121 Introduction to Cameras
Registration #0851-121
This course introduces students to the proper operation of the camera and the control and manipulation of exposure through use of a light meter. Students have the opportunity to demonstrate their abilities by photographing assigned subjects. (Corequisites: NVPP-101, 111)
Lab 3, Credit 2 (F, W, S)

NVPP-122 Introduction to Copy Work
Registration #0851-122
Students use and extend basic camera skills to meet the special needs of copy work. They use 35mm and 4 x 5 copy cameras with a variety of black-and-white and color film types and are introduced to special lighting and exposure techniques. (Grade of C or better in NVPP-101, 111, 121)
Lab 4, Credit 2 (F, W, S)

NVPP-132 Orientation to Photo/Media Careers
Registration #0851-132
This course teaches students about careers in custom photographic laboratory services and media production through field trips, class discussions, and hands-on experiences. After completing this course, students are expected to choose their major area of study (custom photographic laboratory services or media production options). (Grade of C or better in NVPP-101, 111, 121)
Class 1, Lab 3, Credit 2 (F, W, S)

NVPP-200 Basic Color Printing
Registration #0851-200
This course introduces techniques for printing color negatives and evaluating color prints. Students learn principles of color theory and materials and relate these to making prints from color negatives. (Corequisites: NVPP-210, 220)
Lab 8, Credit 4 (F, W, S)

NVPP-201 Custom Lab Services I
Registration #0851-201
This course builds on skills learned in Basic Color Printing and Mechanized Processing. It introduces additional concepts in color negative printing, mechanized processing, and custom lab practices. (Corequisites: NVPP-211, 221) (Grade of C or better in NVPP-200, 210, 220)
Lab 8, Credit 4 (F, W, S)

NVPP-202 Custom Lab Services II
Registration #0851-202
This course, a continuation of Custom Lab Services I, introduces additional skills related to color: negative printing, mechanized processing, internegative calibration and production, quality control, and negative evaluation techniques. (Corequisites: NVPP-212, 222) (Grade of C or better in NVPP-201, 211, 221)
Lab 8, Credit 4 (F, W, S)

NVPP-203 Custom Lab Services III
Registration #0851-203
This course continues to build on concepts and skills learned in Custom Lab Services II. Topics include color analyzers, related translators, and other printing systems. In addition, students learn techniques to produce large color prints and transparencies for display use and prepare a portfolio of finished work. (Corequisites: NVPP-213, 223) (NVPP-202, 212, 222)
Lab 8, Credit 4 (F, W, S)

NVPP-210 Mechanized Processing
Registration #0851-210
This course teaches students how to operate automatic processing equipment for color print, color negative, and color transparency materials. Basic process monitoring and chemical mixing are included. (Corequisites: NVPP-200, 220)
Lab 4, Credit 2 (F, W, S)

NVPP-211, 212, 213 Integrated Custom Lab
Registration #0851-211, 212, 213
These courses offer students real and simulated custom production opportunities to prepare them for work in the photographic laboratory industry. Students practice and maintain skills learned in Custom Lab Services I, II, and III. (Corequisites: NVPP-201, 211 for NVPP-211; NVPP-202, 222 for NVPP-212; NVPP-203, 223 for NVPP-213)
Lab 4, Credit 2 (F, W, S)
This course teaches students how to retouch color prints, including spattering, adjusting selected print areas, and the correction of other defects. Students practice and further develop dry mounting and other print finishing methods. (Corequisites: NVPP-200, 210)

Lab 4, Credit 2 (F, W, S)

NVPP-221 Advanced Black-and-White Printing
Registration #0851-221
This course continues the development of skills taught in Black-and-White Printing and extends skills to cover a variety of paper types and processes. Students learn the relationship between black-and-white and color printing. (Corequisites: NVPP-201, 211) (Grade of C or better in NVPP-200, 210, 220)

Lab 4, Credit 2 (F, W, S)

NVPP-222 Introduction to Slide Duplicating
Registration #0851-222
Students learn slide duplicating techniques and how to use the related equipment and sensitized materials. Evaluation methods related to slide duplication techniques also are presented. (Corequisites: NVPP-202, 212)

Lab 4, Credit 2 (F, W, S)

NVPP-223 Introduction to Color Copy Work
Registration #0851-223
Students learn and practice camera and calibration skills necessary for color copy work. Students use 35mm and 4 x 5 copy cameras with a variety of color film types and sizes. (Corequisites: NVPP-203, 213)

Lab 4, Credit 2 (F, W, S)

NVPP-241 Presentation Graphics I
Registration #0851-241
Students learn to use electronic tools to produce charts, graphs, and work for slide or video reproduction. Methods used to produce typography are taught and practiced and the basics of graphic composition are introduced. Good work habits are emphasized.

Lab 6, Credit 3 (F, W, S)

NVPP-242 Presentation Graphics II
Registration #0851-242
This course teaches students advanced techniques for preparing graphics as well as design principles that can be used to focus attention and convey concepts in presentation graphics. Students gain practice in the use of digital image typesetters, computers, and other production equipment. (NVPP-241)

Lab 6, Credit 3 (F, W, S)

NVPP-251 Presentation Graphics III
Registration #0851-251
This course prepares students to use computer applications in producing graphic displays. The use of advanced graphic applications is taught. (NVPP-242)

Lab 6, Credit 3 (F, W, S)

NVPP-261 Media Photography I
Registration #0851-261
This course provides students in the media production option with an opportunity to increase their skills with cameras, exposure, and light meters. Students are expected to use these skills to meet the needs of specific media-related assignments. Supporting skills in film processing and printing also are practiced.

Lab 6, Credit 3 (F, W, S)

NVPP-262 Media Photography II
Registration #0851-262
This course teaches advanced methods of studio and location photography for creating product, portrait, titling, and scenic images. It also teaches multi-image photography techniques. (NVPP-261)

Lab 6, Credit 3 (F, W, S)

NVPP-271 Videography I
Registration #0851-271
This course introduces students to videography, cameras, videocassette recording, editing, and lighting. Emphasis is on proper operation of video equipment for single-camera productions. Students gain hands-on experience in making a single-camera production. (NVPP-262)

Lab 6, Credit 3 (F, W, S)

NVPP-281 Slide Production I
Registration #0851-281
This course introduces students to the production of duplicate, captioned, and basic special effect slides as well as the production of slides from flat art. Emphasis is on the correct use of equipment and appropriate choice of materials. (NVPP-122, 241)

Lab 6, Credit 3 (F, W, S)

NVPP-282 Slide Production II
Registration #0851-282
This course presents advanced slide duplication techniques, filmstrip production, special effects slide variations, digital film recorders, and color correction techniques. (NVPP-281)

Lab 6 Credit 3 (F, W, S)

NVPP-283 Slide Production III
Registration #0851-283
Students calibrate and use 35mm slide duplicating film and produce intermediate special effects slides requiring computer generated mattes and countermattes. This course, which introduces the operation of basic slide programming equipment and dissolver, emphasizes quality control and testing of film and materials. (NVPP-262, 282)

Lab 6, Credit 3 (F, W, S)

NVPP-290 Audiovisual Equipment Applications
Registration #0851-290
Students learn to set up, operate, and maintain the various types of recorders, optical cameras, projectors, computers, and electronic accessories commonly used in media and media production. Identification and application of various projection and audio formats also are covered.

Lab 4, Credit 2 (F, W, S)

NVPP-296 Media Production Workshop I
Registration #0851-296
Students apply previously learned skills to user-oriented media projects in a simulated work environment where the emphasis is on good work habits, material use, working with others, and professionally produced media products. Students use job tickets and interact with clients. (NVPP-251, 271, 282)

Lab 12, Credit 6 (F, W, S)

NVPP-299 Co-op Work Experience
Registration #0851-299
Credit 0 (F, W, S, Su)
NVPP-301  Advanced Custom Lab Services I
Registration #0851-301
Students begin working with advanced color printing techniques and calibrate representative equipment and sensitized materials. They also learn color slide, negative, and print monitoring systems as well as corrective/prescriptive actions for these processes. (Corequisite: NVPP-314) (Grade of C or better in NVPP-203, 213, 223)
Lab 8, Credit 4 (F, W, S)

NVPP-302  Advanced Custom Lab Services II
Registration #0851-302
Students continue to build advanced color printing skills. Specialized techniques such as masking, multiple printing, replenishment and processor utilization calculations, and advanced theories related to these topics are covered. (Corequisite: NVPP-315) (Grade of C or better in NVPP-301, 314)
Lab 8, Credit 4 (F, W, S)

NVPP-303  Advanced Custom Lab Services III
Registration #0851-303
This course emphasizes critical color printing skills and techniques and presents additional color theory. Students work to develop portfolios that reflect their technical skills. (Corequisite: NVPP-316) (Grade of C or better in NVPP-302, 315)
Lab 8, Credit 4 (F, W, S)

NVPP-314,315,316 Integrated Custom Lab
Registration #0851-314,315,316
These courses provide students with real and simulated custom production work. Students practice and maintain skills learned in Advanced Custom Lab Services I, II, and III. (Corequisite: NVPP-301 for NVPP-314; NVPP-302 for NVPP-315; NVPP-303 for NVPP-316)
Lab 4, Credit 2 (F, W, S)

NVPP-343  Presentation Graphics IV
Registration #0851-343
In this course, students produce graphics for slide and computer applications and prepare multicolor graphics for optical effect slides. A series of graphs is designed for computer application. (NVPP-251)
Lab 6, Credit 3 (F, W, S)

NVPP-352  Presentation Graphics V
Registration #0851-352
In this course, students continue to solve graphic problems and use computer graphic systems as tools to create presentation graphics. (NVPP-343)
Lab 6, Credit 3 (F, W, S)

NVPP-372  Videography II
Registration #0851-372
This course teaches operation of television studio cameras, lighting, switching, and digital titling. Students gain experience working in a television studio and control room. Post-production techniques are taught, and productions are made. (NVPP-271)
Lab 6, Credit 3 (F, W, S)

NVPP-373  Videography III
Registration #0851-373
This course combines single-camera remotes with studio productions and teaches advanced post-production techniques. Students produce their own television programs and are encouraged to try new video techniques. (NVPP-372)
Lab 6, Credit 3 (F, W, S)

NVPP-384  Slide Production IV
Registration #0851-384
This course emphasizes the production of advanced special effects slides and introduces the production of in-camera matte techniques and the creation of animation sequences. Optical and digital cameras are used for slide production. (NVPP-283)
Lab 6, Credit 3 (F, W, S)

NVPP-385  Slide Production V
Registration #0851-385
In this course, students produce a catalog of special effects slides and document slide production procedures, materials, and equipment. (NVPP-384)
Lab 6, Credit 3 (F, W, S)

NVPP-396  Media Production Workshop II
Registration #0851-396
This course, taken in the last quarter of the program, requires practical solutions to problems in presentation graphics, still photography, computers, television, and slide production. Students must produce appropriate media materials when given projects in a typical work environment. Portfolios are expanded. (NVPP-352, 373, 385)
Lab 12, Credit 6 (F, W, S)

NVPP-397  Media Seminar
Registration #0851-397
This course, taken during the last quarter of the associate degree option in media production, provides a relevant framework for students' previous media production courses. It also prepares students for continued growth on the job by emphasizing new directions in media production. Students may study independently a topic agreed upon with their instructor. Portfolios are expanded. (NVPP-352, 373, 385)
Class 1, Lab 5, Credit 2-6 (F, W, S)

NVPP-399  Independent Study
Registration #0851-399
Credit Variable

Printing Production Technology

NVCR-100  Printing Production Technology
Registration #0822-100
Career Exploration
This course explores printing as a career choice to help students make well-informed decisions regarding the area in which they will concentrate their studies. Students receive opportunities to explore their interest in printing through hands-on experiences with printing equipment and tools. Although non-technical in nature, this course does provide opportunities for students to increase their awareness of necessary printing skills, the industry as a whole, the program, and expectations of the printing production technology department. Technical areas of study include composition and paste-up, reproduction photography, stripping and platemaking, and press and finishing.
Lab 2, Credit 1 (F, W, S)

NVCR-141  Page Creation Methods—Level I
Registration #0822-141
This course prepares students to be paste-up artists and photolettering machine operators. Students learn the use of layout grids, adhesives, and mechanical drawing tools. State-of-the-art headline and special effect typographic equipment is used and maintained. The course includes an introduction to direct input phototypesetters.
Class 4, Lab 4, Credit 5 (F, W, S)
NVCR-142  Fundamentals of Reproduction Photography—Level I
Registration #0822-142
This course prepares students to be entry-level camera operators. Workers with this job title make films and paper prints used in the preparation of printed products. Students learn chemical mixing, lith and rapid access tray processing, machine processing, basic contact printing, basic halftone negative and print production, camera maintenance, and how to determine basic exposures and change copy size.
Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-143  Basic Film Assembly and Platemaking—Level I
Registration #0822-143
This course prepares students to be single-color strippers and platemakers in the offset printing industry. Students learn single-color stripping, including halftones, tints, reverse and surprint type, manual step, and various signature impositions. Students learn to use contact and duplicating film and proofing methods to calibrate, expose, and process subtractive and direct photo plates.
Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-144  Basic Lithographic Duplicator Operation—Level I
Registration #0822-144
This course prepares students to be duplicator operators. Included is instruction on various duplicators that are widely used by in-plant and commercial printers. A systematic method of preparation, operation, and maintenance is emphasized. The operation of small power stitchers, paper drills, paper cutters, and commercial type folders is taught.
Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-170.269, 270,271,272  Production Printing Registration #0822-170, 269,270,271,272
The production printing laboratory sequence is a simulated work experience in which each student is expected to work from a job ticket. Job procedures, good skills, production rates, and work habits are emphasized. Previously learned skills are reinforced. The complexity of jobs increases in each production course. (NVCR-170 for NVCR-269; NVCR-269 for NVCR-270; NVCR-270 for NVCR-271; NVCR-271 for NVCR-272)
Lab 4, Credit 2 (F, W, S)

NVCR-251  Computerized Typesetting—Level II
Registration #0822-251
This course prepares students to be keyboard and phototypesetter operators. Special keyboard functions of various machines are presented and practiced for familiarity. Special function codes are used to drive different phototypesetters. Complete operation of several phototypesetters is taught. (Touch-typing skills, NVCR-141)
Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-252  Electronic Publishing—Level III
Registration #0822-252
This course teaches students with advanced keyboarding procedures for complex typographic formats, including skills in telecommunication with computers and word processors. The layout and paste-up skills learned in Page Creation Methods are used in new, more complex applications. (Touch-typing skills, NVCR-251)
Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-254  Computer Publishing
Registration #0822-254
Computer Publishing Methods—Level IV
This advanced course in electronic publishing methods and techniques emphasizes paint/draw programs, interactive and format-based page makeup, image scanning, special effects typography, and elementary PostScript programming. (NVCR-252)
Class 2, Lab 6, Credit 5 (F, W, S)

NVCR-255  Advanced Halftone and Line Technique—Level II
Registration #0822-255
This course prepares students to be camera operators. Graduates with this job title can do advanced line photography, halftones, 50 percent dot placement for tone reproduction, related contacting, proofing, and film processing as required by in-plant printing departments, newspapers, and commercial printing companies. (NVCR-142)
Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-256  Color Separation Methods—Level III
Registration #0822-256
This course prepares students to be color separators, color scanner operators, and dry-dot etchers. Graduates with these job titles can make duotones, direct color separations, color corrections by dry-dot etching, required color proofs, and with limited on-the-job training, operate a color scanner. (NVCR-255)
Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-257  Color Scanning Methods—Level IV
Registration #0822-257
This course prepares students to enter the printing industry as color scanner operators. Areas of study include copy evaluation, color separation of transparencies and reflection copy, scanner linerization, scanning problem copy, color proofing and correction, gray component replacement, and color separation for different reproduction methods. (NVCR-256)
Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-261  Flat Color Film Assembly—Level II
Registration #0822-261
This course continues students' preparation for the offset printing industry. Students learn skills necessary for stripping, proofing, and platemaking flat color. Skills learned include multitone and multicolor work using tints, duotones, special effects, and spot color. Students use a precision pin register system throughout the stripping, proofing, and platemaking operations for all jobs. Additional skills include determining imposition planning and quality control systems for film, proof, and plate exposures and processing. (NVCR-143)
Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-262  Process Color Film Assembly—Level III
Registration #0822-262
This course teaches students process color stripping procedures and considerations. Included are various methods of aligning negatives, stripping multiple sets on the same form, matching color using process color tints, stripping reverse and surprint type in process color areas, split-page/form stripping, making spread and choked negatives and positives, and making composite negatives and positives. (NVCR-161)
Class 4, Lab 4, Credit 5 (F, W, S)
English Learning Center assignments are required. The course is contemporary topics; and the use of writing to report events. Vocabulary and comprehension skills needed to read about Class 5, Lab 2, Credit 4 (F) for students with basic English skills.

NCPN-110 Ideas in English/A Registration #0862-110
This is a summary course that integrates four communication skills—reading, writing, grammar, and vocabulary. Materials in each area provide reinforcement, follow-up activity, or context for the three other areas. To this end, grammar and vocabulary are contained in the reading assignments; reading provides inspiration for the writing assignments; and writing assignments contain vocabulary and structures taught in the grammar portion. English Learning Center assignments are required. This course is for students with low to intermediate English skills.

Class 5, Lab 2, Credit 4 (F)

NCPN-111 Ideas in English/C Registration #0862-111
In this course, students work on English needed for college reading and writing activities. Students study complex sentences and advanced verb patterns, reading for understanding, summarizing information, and communicating ideas clearly in longer writing assignments. English Learning Center assignments are required. (NCPN-110)

Class 5, Lab 2, Credit 4 (S)

Integrative Courses

NCPN-103 English in American Life Registration #0862-103
This course continues the study of process color film assembly techniques and related applications. Areas of study include computing aided masking methods, use of a precision line-up table, web offset film assembly considerations, quality control targets, and auto stripping/register systems. (NVC-R-262)

Class 4, Lab 4, Credit 5 (F, W, S)

NCPN-105 Social Issues Registration #0862-105
This course is designed to help students develop better reading and writing skills. Social issues such as child abuse and drug misuse are discussed. Students have opportunities to improve communication skills by completing a variety of vocabulary, grammar, and writing exercises. Summary writing is stressed and is preceded by a variety of writing exercises. English Learning Center assignments are required. This course is for students with intermediate to high English skills.

Class 3, Lab 2, Credit 4 (F, W, S)

NCPN-107 Language Structure in Written English Registration #0862-107
This course provides students with instruction and practice in using appropriate language structures for different writing purposes. The course has three parts: reading and studying the content and meaning of different modes of writing; analyzing and practicing the various grammatical and structural strategies used in different modes; and writing and editing papers in the various modes. Generally, descriptive, narrative, and several forms of expository writing are reviewed. This course is appropriate for students with high-level English skills.

Class 4, Credit 4 (F, W, S)
NCPN-112  Writing for Different Purposes  
Registration #0862-112  
In this course, students use English skills to organize ideas and solve problems in situations related to their technical coursework in college and to their employment environments after graduation. Students are expected to work individually and in small groups to read and prepare written descriptions, requests, recommendations, and short reports. (California Reading Test score of 6.5-8.5, 12 credits of NTID English, one year in an area of specialization)  
Class 3, Credit 3 (W, S)

NCPN-113  Verbs and Complements  
Registration #0862-113  
This course deals with verb tense, agreement, active and passive voice. It includes a detailed study of complementation, which involves the writing of several short passages. Students also work on vocabulary development. (NCPN-174, California Reading Test score of 8.0-10.0, Michigan Test score of 55-70)  
Class 4, Lab 1, Credit 4 (W, S)

NCPN-114  Reading English Dialogue  
Registration #0862-114  
This course is designed to help students improve their skills in writing English and using English words. It provides instruction in two areas: the use of verbs in different kinds of sentences and the independent analysis of vocabulary words. There is heavy emphasis on reading with practice also in writing skills. English Learning Center assignments are required. (California Reading Test score of 7.0-9.0, Michigan Test score lower than 60)  
Class 4, Lab 2, Credit 4 (F, W, S)

NCPN-118  Self-Expression  
Registration #0862-118  
In this course, students explore communication and self-expression through discussions; viewing films; reading materials; and practicing reading, writing, signing, and speechreading. The course uses vocabulary and structural forms that are common in social, academic, and professional situations. Vocabulary clues, reading skills, and descriptive phrases are important parts of this course. English Learning Center assignments are required. (California Reading Test score higher than 7.5)  
Class 4, Lab 2, Credit 4 (W)

NCPN-119  Mass Communication  
Registration #0862-119  
This course utilizes selections from literature and current newspaper and magazine articles to give students an idea of the power of language and to teach them sentence structure and paragraph organization in popular literature. English Learning Center assignments are required. (California Reading Test score higher than 7.5)  
Class 4, Lab 2, Credit 4 (W)

NCPN-120  English and the Arts  
Registration #0862-120  
This course uses vocabulary and structural forms common in social, academic, and professional situations as well as slides and reading materials that provide an opportunity to practice complex sentence forms. Students learn idioms and verb forms in connection with art history and photojournalism. English Learning Center assignments are required. (California Reading Test score higher than 7.5)  
Class 4, Lab 2, Credit 4 (S)

NCPN-121  Improving Vocabulary Through Reading  
Registration #0862-121  
This course is a continuation of English in American Life. The focus is on integrating the four communication skills—reading, writing, vocabulary, and grammar. Vocabulary, grammar, and writing assignments are based exclusively on the readings and are intended to provide continual follow-up, review, and support for material learned. English Learning Center assignments are required. (NCPN-103)  
Class 4, Lab 2, Credit 4 (W)

NCPN-122  Quantitative Concepts  
Registration #0862-122  
This course teaches students vocabulary and sentence structures that are used in mathematical word problems. Students practice reading, writing, and performing calculations for word problems dealing with subjects that include wages, taxes, working hours, and cost of products. English Learning Center assignments are required. (California Reading Test score of 7.0-8.5)  
Class 4, Lab 2, Credit 4 (F)

NCPN-123  Famous Scientists  
Registration #0862-123  
This course teaches students vocabulary and sentence structures that are used in technical reading and writing. Students read a textbook covering the lives of famous scientists, then practice reading and writing biographical information about these people. English Learning Center assignments are required. (California Reading Test score of 7.0-8.5)  
Class 4, Lab 2, Credit 4 (F, W, S)

NCPN-124  The Earth and Universe  
Registration #0862-124  
This course examines vocabulary and sentence structures used in technical reading and writing. Students read textbooks covering various topics in geology and astronomy. Electronic media is used to practice reading and writing compositions on geology and astronomy. English Learning Center assignments are required. (California Reading Test score of 7.0-8.5)  
Class 4, Lab 2, Credit 4 (F, W, S)

NCPN-125  Library Research for Writing  
Registration #0862-125  
This course teaches library techniques for writing research papers and helps students develop vocabulary, sentence structure, and composition skills. Students read textbooks about libraries and writing, visit the library several times, and write one or more college research papers. Classroom lectures cover card, microfiche, and computer catalogs; indexes; organizing and outlining ideas; and word processing as applied to research papers, including how to prepare footnotes and bibliographies. (California Reading Test score of 8.0-10.0)  
Class 4, Credit 4 (F, W, S)

NCPN-131  Changing World  
Registration #0862-131  
This course reviews parts of speech, selected phrases and clauses, and kinds of sentences. It applies this review to the practical task of understanding a variety of texts related to the theme of idealism and reality in American life. Texts have included Of Mice and Men, "I Have a Dream," personal accounts of communal living, and a science fiction short story. English Learning Center assignments are required. (NCPN-105)  
Class 3, Lab 2, Credit 4 (F, W, S)
NCPN-132 Medical Issues
Registration #0862-132
This is an advanced technical English course designed to help students develop better reading and writing skills. Students discuss medical issues, including the cause, spread, and prevention of disease, and have opportunities to become familiar with the language of everyday medical science. English Learning Center assignments are required. (NCPN-105)
Class 3, Lab 2, Credit 4 (S)

NCPN-133 Visual Arts
Registration #0862-133
Students in this course read a variety of texts that develop the human dimensions of issues related to photography. The course stimulates students to improve their English through use of captioned and uncaptioned slides; famous photos, including shots of Iwo Jima and Kent State; song lyrics; and art. English Learning Center assignments are required. (NCPN-105)
Class 3, Lab 2, Credit 4 (W)

NCPN-134 Writing Scientific English
Registration #0862-134
This course introduces students to a broad range of topics related to the technical aspects of society. Emphasis is placed on developing reading skills, acquiring new vocabulary in context, and skimming and scanning procedures. This course is most useful to engineering and science students. English Learning Center assignments are required. (California Reading Test score higher than 8.0, Michigan Test score higher than 60)
Class 3, Lab 2, Credit 4 (F, W)

NCPN-135 Reading Scientific English
Registration #0862-135
In this course, designed to improve reading and writing skills, students discuss measurements, dimensions, and properties of objects used in experiments. General technical reading and grammar skills also are used. Homework includes writing short compositions, letters, and laboratory reports. This course is recommended for engineering and science students. English Learning Center assignments are required. (California Reading Test score higher than 8.0, Michigan Test score higher than 60)
Class 3, Lab 2, Credit 4 (W, S)

NCPN-136 American Experiences
Registration #0862-136
This integrative course focuses on the theme of alienation in American society. The course requires students to read and discuss articles or a novel, do vocabulary work, complete comprehension exercises, and write compositions related to the articles or novel. English Learning Center assignments are required. (NCPN-105)
Class 3, Lab 2, Credit 4 (W, S)

NCPN-138 Reading and Thinking in English
Registration #0862-138
This course is designed to improve students’ skills in reading and thinking. Short articles covering such topics as drugs and pollution are read, analyzed, and discussed. Vocabulary and grammar also are covered, and opportunities to improve writing are provided. Course activities include reading, writing, discussion, drill, and practice. (California Reading Test score of 6.0-8.0, Michigan Test score of 45-60, writing test score lower than 60; or recommendation of technical program)
Class 5, Lab 1, Credit 4 (F)

NCPN-139 Reading, Thinking, and Writing
Registration #0862-139
This course is designed to improve students’ reading, writing, and thinking skills. Short articles covering such topics as AIDS and human rights are read, analyzed, and discussed. Three feature-length captioned movies are shown and serve as the basis for written reports. Course activities include reading, writing, discussion, drill, and practice. (California Reading Test score of 6.5-8.0, Michigan Test score of 50-60, or writing test score of 45-60; or completion of NCPN-138)
Class 5, Lab 1, Credit 4 (W)

NCPN-144 Clear Thinking and Writing
Registration #0862-144
This critical thinking course includes critical reading, using language for personal analysis, writing for persuasive purposes, and studying the vocabulary of inference and implication. (NCPN-107)
Class 4, Credit 4 (W, S)

Emphasis Courses—Reading

NCPN-150 English in Context
Registration #0862-150
This course focuses on reading a novel and discussing the structures of English involved in the description of location (setting) and sequence of events (plot) in a narrative. It also touches on the organization and sequencing of facts in a composition. (California Reading Test score of 7.0-9.0)
Class 2, Credit 2 (F, W, S)

NCPN-152 Reading a Novel
Registration #0862-152
This course, which emphasizes the reading process, offers instruction in the elements of a novel. It provides experience in discussing and writing about a novel in terms of its setting, characterization, and conflict. To encourage reading for details, drawing conclusions, and making inferences, the course also provides experience with an interactive computer novel. (California Reading Test score lower than 8.5)
Class 4, Credit 3 (F, W, S)

NCPN-153 Reading for Language Learning
Registration #0862-153
This course is designed to help students use reading as a means of improving general English skills. The course emphasizes the skills involved in controlling reading processes to improve understanding and in learning new information while reading. Students learn the skills involved in using dictionaries and encyclopedias to increase world knowledge while reading. Some of the reading assignments involve the use of interactive computer materials that require problem solving and use of information during the reading process. (California Reading Test score of 7.0-9.0, Michigan Test score higher than 50)
Class 3, Credit 3 (F, W, S)

NCPN-154 Reading and Vocabulary Skills for the Social Sciences
Registration #0862-154
This course helps students develop reading skills, vocabulary, and strategies for understanding and studying textbooks from a variety of college disciplines. Reading materials in this course are primarily longer nonfiction materials from various college subjects, such as political science, psychology, anthropology, and history. These materials introduce general background knowledge and vocabulary useful for a variety of college social science disciplines. (California Reading Test score of 8.0-9.5)
Class 3, Credit 3 (F, W, S)
NCPN-155  Reading for Comprehension in the Liberal Arts
Registration #0862-155
This course allows students to practice college reading skills while they learn vocabulary and develop reading strategies for learning abstract ideas and acquiring information. Materials in this course emphasize important background knowledge and vocabulary useful for a variety of liberal arts courses while sampling from traditional liberal arts disciplines such as anthropology, history, religion, and science. Vocabulary units include key concepts from these disciplines. The course includes practice reading and studying textbooks, outlining, taking lecture notes, and using reference books to provide background knowledge and help in solving reading comprehension problems. (California Reading Test score higher than 9.2 or grade of A or B in another reading emphasis course)
Class 3, Credit 3 (F, W, S)

NCPN-156  Literature Seminar
Registration #0862-156
This course involves reading novels or short stories based on a specific theme. The course helps students become interactive, reflective, and thoughtful readers. Interaction between students and instructors helps students gain a cultural and historical perspective. (California Reading Test score higher than 9.0)
Class 3, Credit 3 (F, W, S)

Emphasis Courses—Vocabulary

NCPN-160  Vocabulary Through ASL
Registration #0862-160
This course is for students whose preferred method of communication is American Sign Language (ASL). The course is designed to develop ability and confidence in translating ASL vocabulary into English equivalents. It includes translation principles, ASL vocabulary items, and English idioms. (ASL knowledge, rating of 4 or 5 on the Sign Instruction Placement Interview)
Class 2, Lab 1, Credit 2 (F, W, S)

NCPN-161  Business Vocabulary
Registration #0862-161
In this course, students read nine stories about famous business people/inventors. Each week, more than 60 vocabulary words are chosen for students to use in practice exercises and games, and weekly tests are given on half of these words. Other exercises include weekly reading comprehension, determination of anaphoric references, derivational morphology, and some inductive syntax. All vocabulary, grammatical, morphological, and anaphoric exercises relate to the context of the readings. (California Reading Test score higher than 8.0)
Class 3, Lab 2, Credit 4 (S)

NCPN-162  Vocabulary/Dictionary Skills
Registration #0862-162
This course helps students develop self-reliant methods for improving their vocabulary. To achieve the course's primary goal of developing advanced dictionary skills, students use the *Longman* and *Merriam-Webster* dictionaries. (California Reading Test score of 7.5-9.9, Michigan Test score of 60-80)
Class 2, Credit 2 (F, W, S)

NCPN-163  English Idioms
Registration #0862-163
This course is designed to help students understand and use common English idioms. Students are encouraged to bring to class for discussion idioms that they encounter. Idioms are discussed and practiced in context. Activities include written assignments and student participation. (California Reading Test score higher than 8.5)
Class 2, Credit 2 (F, W, S)

NCPN-164  Popular Film and English
Registration #0862-164
This course is designed to expose students to popular films and readings related to films in order to develop vocabulary skills and general world knowledge. Students then use the vocabulary in essays that express opinions about a variety of film genres. By viewing captioned films, students are introduced to the concept of genre and learn about the connection between film and literature. (California Reading Test score higher than 9.0, Michigan Test score higher than 65, or completion of a writing emphasis course with grade of B or better or permission of instructor)
Class 4, Lab 4, Credit 4 (F, S)

Emphasis Courses—Grammar

NCPN-171  Introduction to Complex Sentences
Registration #0862-171
This course is designed to improve English skills for constructing sentences and using new vocabulary. It provides instruction in two areas: the structure of sentences with two verbs and a connector and the analysis of independent vocabulary words. The course concentrates on improving written communication and developing reading skills. English Learning Center assignments are required. (NCPN-100)
Class 4, Lab 2, Credit 4 (F, W, S)

NCPN-172  Identifying Parts of Speech
Registration #0862-172
In this course students learn definitions of parts of speech and their functions in a sentence. Students also learn how to identify the parts of speech of new vocabulary and how to use the words appropriately in a sentence. The course focuses on the different uses of words that can function as more than one part of speech. It also explains root words and how different derivational morphemes can change words into different parts of speech. (Michigan Test score lower than 70)
Class 2, Credit 2 (F, W, S)

NCPN-173  Basic English Phrase Structure
Registration #0862-173
This course emphasizes grammar and deals with phrase structure, including noun and verb phrases. Gerunds also are introduced. Students are required to read a short novel and work on vocabulary development.
Class 4, Lab 1, Credit 4 (F)

NCPN-174  Adverbials and Basic Clause Structure
Registration #0862-174
This course emphasizes grammar and deals with adverbials, including single-word and adverb phrases; basic clause structure, including adjective and adverb clauses; and noun clause complements. Students also are introduced to coordination. In addition, students are required to read a short novel and work on vocabulary development. (NCPN-173)
Class 5, Lab 1, Credit 4 (W)
NCPN-175  English Phrase Structure  Registration #0862-175
This course, the first in a sequence of two, deals with parts of speech and phrase structure, including noun, verb, adjective, and adverb phrases. In addition, students are required to read a short novel and work on vocabulary development. This course is not for students who have completed Basic English Phrase Structure or Adverbials and Basic Clause Structure. (California Reading Test score of 7.0-8.5, Michigan Test score of 55-65)
Class 4, Lab 1, Credit 4 (F, W, S)

NCPN-176  English Clause Structure, Tense, and Passive Voice  Registration #0862-176
This course, which emphasizes grammar, is the second in a sequence of two. It deals with English clause structure, including adjective, adverb, and noun clause complements. Coordination also is introduced, and verb tense is covered. In addition, students are required to read a short novel and work on vocabulary development. (NCPN-175)
Class 4, Lab 1, Credit 4 (F, W, S)

NCPN-178  English Discourse Grammar  Registration #0862-178
This course is designed to help students better express ideas in written English. Two hours a week, formal grammar is studied, including the semantic function of sentence constituents and classical grammar (fragments, run-ons, pronoun reference, subject/verb agreement, consistent tense, etc.). One hour each week is devoted to composition, which then is evaluated for discourse and grammar components. One hour each week is devoted to reading for comprehension through grammatical cues (passive voice, tense, etc.). (NCPN-107)
Class 4, Credit 4 (W, S)

**Emphasis Courses—Writing**

NCPN-180  Basic Composition  Registration #0862-180
The course provides instruction in composition writing at the basic level. It focuses on the areas of English sentence structures for composition coherence, development of a more flexible vocabulary, and practice with different styles of composition organization. Students write compositions based on nonverbal films and discuss the areas mentioned above. (Michigan Test score lower than 60)
Class 2, Credit 2 (F, W, S)

NCPN-181  Organizing Paragraphs  Registration #0862-181
This course offers instruction and practice in developing short, well-organized compositions. The course focuses on two areas: intensive practice in developing specific writing skills, such as topic sentences, detail (supporting) sentences, outlining, and transition words; and learning to use different composition styles such as description, classification, cause/effect, comparison/contrast, and personal opinion. (California Reading Test score higher than 7.5, Michigan Test score higher than 55, or NCPN-180)
Class 2, Credit 2 (F, W, S) Class 3, Credit 3 (W)

NCPN-183  Essay Writing  Registration #0862-183
This course focuses on the development of essay writing skills. Essays provide the basis for many types of writing, including proposals, research papers, and memos. Skill in writing essays also is required for the liberal arts curriculum. This course reviews basic paragraph structure, structure of essays, how to express a view or opinion, and how to defend it logically with reason or examples. (California Reading Test score higher than 8.5, Michigan Test score higher than 60, or grade of B or better in NCPN-181)
Class 3, Credit 3 (F, W, S)

NCPN-187  Creative Writing  Registration #0862-187
This course is designed for students who need or want to improve their creative thinking and writing skills. The focus of the course is on stories and poetry. Students learn the mechanics of short stories and poetry and participate in assignments designed to improve their ability to think and write using imagination, imagery, descriptions, and feelings. (Michigan Test score higher than 60)
Class 2, Credit 2 (F, W, S)

NCPN-188  Practical Writing  Registration #0862-188
This course is designed to help students become skilled in practical, everyday writing. Students practice writing directions, forms, letters, notes, memos, ads, and reports that may be encountered in both the workplace and their personal lives. The emphasis is on form, content, and special grammatical structures necessary for professional writing. (Michigan Test score of 50-65)
Class 3, Credit 3 (F, W, S)

NCPN-189  Professional Writing  Registration #0862-189
This course examines various types of letters, memos, and reports that students may encounter in the workplace. The emphasis is on form, content, and special grammatical structures necessary for professional writing. (Michigan Test score higher than 65)
Class 3, Credit 3 (F, W, S)

NCPN-399  Independent Study  Registration #0862-399
This course is designed for students with special needs that cannot be met by another English course. Students are required to write a contract describing what the course will cover. The contract must be signed by the student, instructor, and chairperson. Students interested in this course should talk to their communication advisor.
Credit 1-4 (F, W, S)
Speech-Language-Hearing Center

**Audiology**

**NCPU-101 Strategies and Speech Registration #0861-101**
This introductory course is recommended for students interested in speech therapy. It is designed to help students improve communication with people who do not know sign language. The course introduces basic speech and speechreading concepts as well as a variety of alternative communication strategies. Particular emphasis is placed on oral strategies to facilitate communication. (Speech score lower than 3.0, speechreading score [with or without sound] lower than 35 percent, Michigan Test score lower than 70)
Class 2, Lab 1, Credit 2 (F, W, S)

**NCPU-103 Survival Strategies for the Basic Registration #0861-103 Speechreader**
This course is designed to help students improve their communication with people who do not know sign language. Students are introduced to speechreading and learn a variety of alternative communication strategies. Particular emphasis is placed on writing as a means of facilitating communication. (Speech score lower than 3.0, speechreading score [with or without sound] lower than 35 percent, Michigan Test score lower than 70)
Class 2, Lab 1, Credit 2 (F, W, S)

**NCPU-105 Practicing Communication Strategies Registration #0861-105**
This course provides review, practice, and integration of newly acquired listening, speechreading, speech, and strategy skills. It is a follow-up course for students who have completed any basic speechreading or strategy courses. Students role play a variety of everyday and work-related situations with people who do not know sign language. Overall communication success is evaluated by both students and instructor using a videotape format. Students also learn how to use these communication skills to succeed in basic conversations and conflict situations with non-signers. (One of the following: NCSPH-177, NCP-101, NCPU-103, NCPU-155, or NCPU-157; speechreading score [with or without sound] lower than 35 percent)
Class 2, Credit 2, (F, W, S)

**NCPU-115 Communication for the Job Interview Registration #0861-115**
This course focuses on improving the communication aspect of the job interview through a series of practice interviews. It is designed for students who have difficulty communicating during an interview and is appropriate for students who prefer to use writing to communicate during the interview. (NGGE-101, speech score lower than 3.0, completion of at least three quarters in program of study)
Class 2, Lab 1, Credit 2 (W, S)

**NCPU-118 Orientation to Hearing Aids Registration #0861-118 and Listening**
This course is for students who have not used a hearing aid in a long time. It provides information about hearing aids and an opportunity to use them in supportive and structured situations. It also exposes students to the benefits of amplification through listening practice. This course meets twice for class lecturing and listening practice and once for individual hearing aid evaluation/listening laboratory practice each week. (Recommendation by audiologist, new earmold, $50 fee upon acceptance of new hearing aid)
Class 2, Lab 1, Credit 2 (F, W, S)

**NCPU-120 Auditory Training for Auditory Registration #0861-120**
This auditory training course is designed to help students learn the meaning of sound. Since students in the first two auditory profiles often are part-time hearing aid users, the major goal is to help them become better listeners. Students meet three times each week to participate in both group and individual practice listening for syllables, stress, and duration. Practice with these materials helps students’ speechreading skills. Environmental sound training, with special emphasis on warning sounds and music, also is included. (Use of hearing aid, auditory profile of 1 or 2)
Class 2, Lab 1, Credit 2 (F, W, S)

**NCPU-130 Auditory Training I Registration #0861-130 for Profile 3 Students**
The goal of this course is acquisition of listening skills. Listening materials include words, sentences, short stories, and songs. Development of vocabulary skills is integrated into all listening activities. Classes meet twice weekly and a weekly one-hour laboratory is held for additional listening activities and lectures on topics related to audition and amplification. (Auditory profile of 3, use of amplification all or most of the time, speechreading score [with or without sound] higher than 35 percent)
Class 2, Lab 1, Credit 2 (F, W, S)

**NCPU-135 Auditory Training II Registration #0861-135 for Profile 3 Students**
This course is a continuation of Auditory Training I for Profile 3 Students in which auditory training is continued for the acquisition of listening fluency and comprehension. (NCPU-130, auditory profile of 3, use of amplification all or most of the time, speechreading score [with or without sound] higher than 35 percent)
Class 2, Lab 2, Credit 2 (F, W, S)

**NCPU-140 Auditory Training I Registration #0861-140 for Profile 4 and 5 Students**
The focus of this course is to help students acquire listening fluency and auditory comprehension skills. Classes meet twice weekly for group listening activities, group discussions, and lectures on special topics related to audition and amplification. A one-hour listening laboratory is held weekly for individual listening activities. Auditory activities for this course include books and short stories on audiotapes, music listening, and speech perception in noise. Vocabulary skill development also is emphasized. (Auditory profile of 4 or 5, use of amplification all or most of the time)
Class 2, Lab 1, Credit 2 (F, W, S)

**NCPU-145 Auditory Training II Registration #0861-145 for Profile 4 and 5 Students**
This course is a continuation of Auditory Training I for Profile 4 and 5 Students. The focus of the course is to continue auditory training for the acquisition of listening fluency and auditory comprehension skills. Vocabulary skill development is emphasized, and listening activities include music and books on audiotape. Special emphasis is placed on auditory skills and strategies for successful communication in social and vocational situations. Classes meet twice weekly for group lectures, discussions, and listening activities, and a one-hour laboratory is held weekly for individual listening activities. (NCPU-140, auditory profile of 4 or 5, use of amplification all or most of the time)
Class 2, Lab 1, Credit 2 (F, W, S)
This course develops reception of words, everyday sentences, and on-the-job social sentences by using speechreading and listening. Some auditory-only exercises are done in class and for laboratory assignments. Knowledge of strategies and associational cues is reviewed. (NCPU-101 or NCPU-103, speechreading score [with or without sound] lower than 35 percent, Michigan Test score lower than 70, auditory profile higher than 1, use of amplification in class and lab)

Class 2, Lab 2, Credit 2 (F, W, S)

This course is designed to help students use their visual skills to understand speakers. Students practice interpreting verbal and nonverbal information, facial expressions, eye glances, gestures, and body movements as people talk. Practice activities include speechreading and listening to individual words and everyday sentences. Students may be required to speechread hearing people during a practice interview. (Speechreading score [with or without sound] lower than 35 percent, Michigan Test score higher than 69)

Class 2, Lab 1, Credit 2 (F, W, S)

In this course, speechreading and listening are used to help students understand sentences and short paragraphs. Strategies to assist communication are reviewed and practiced in conversational interviews with hearing staff members. (Speechreading score [with or without sound] of 35-60 percent, Michigan Test score lower than 70)

Class 2, Lab 1, Credit 2 (F, W, S)

The intent of this course is threefold: to improve students' ability to speechread in noisy environments and to speechread difficult speakers, to develop factual knowledge to optimize receptive communication skills, and to develop useful strategies for communicating with hearing people. Students are challenged by a variety of speechreading exercises with and without sound. They learn pronunciation techniques, practical strategies for communicating in social and job environments, and skills for speechreading sentences and paragraphs. Class participation is strongly emphasized. (Speechreading score [with or without sound] higher than 60 percent, use of amplification in class and lab)

Class 2, Lab 1, Credit 2 (F, W, S)

This course is designed to help students improve their speech and speechreading of technical vocabulary associated with their areas of specialization. This is a small-group class, with one discussion hour, one individual practice hour, and one homework laboratory hour weekly. Group discussions are provided on work communication, strategies, associational cues, and interviews. Individual practice includes speechreading key vocabulary as well as sentences and short paragraphs from technical areas of specialization. Students also practice pronouncing technical vocabulary with a speech instructor during individual practice hours. (Speech score lower than 3.0, speechreading score [with or without sound] higher than 60 percent, pass vocabulary test on first day of class, completion of at least three quarters in program of study)

Class 2, Lab 1, Credit 2 (F, W, S)

This course teaches students about regular telephones and different kinds of telecommunication devices for the deaf (TDDs). Students use TDDs to make long-distance and emergency calls and appointments. They learn what to do if they have a bad connection or are disconnected. Each student makes calls using amplifiers and pay telephones. They are taught special codes for listening and speaking on the telephone. (Auditory reception score below 40 percent)

Class 2, Lab 1, Credit 2 (F, W, S)

This course is offered to help students improve their ability and confidence in using the telephone with strangers. Students learn a variety of techniques, including the best way to use their hearing aids with the telephone, how to make long-distance calls, get information, make appointments over the telephone, and what to do if they have problems or an emergency. Students practice using special strategies to improve their talking and listening over the telephone. They also practice with pay phones. Students are required to practice making telephone calls every week. The instructor works with each student individually during four special appointments. (Speech score 3.4 or higher, auditory reception score 40 percent or higher, telephone in room or apartment, use of amplification all or most of the time)

Class 2, Lab 1, Credit 2 (F, W, S)

This course is designed for students with special needs that cannot be met by another communication course. Students are required to write a contract describing what the course will cover. The contract must be signed by the student, instructor, and chairperson. Students interested in taking an independent study must talk to their communication advisor.

Credit 1-4 (F, W, S)
### Speech-Language

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Registration #</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>NCPH-101</td>
<td>Speech Therapy I</td>
<td>0860-101</td>
<td>This course helps students improve their speech. Special tests allow the teacher to evaluate individual needs. Students meet with a speech instructor for two hours per week and practice in the laboratory for one hour each week. Instruction may include training in voice, pitch control, articulation (speech sounds), and loudness control. Students practice words, phrases, sentences, and conversations. (Speech priority rating of C)</td>
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<td>Class 2, Lab 1, Credit 2 (F, W, S)</td>
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<tr>
<td>NCPH-102</td>
<td>Speech Therapy II</td>
<td>0860-102</td>
<td>This course is designed to help students improve their speech. Special tests allow the teacher to evaluate individual needs. Students meet with a speech instructor for two hours per week and practice in the laboratory for one hour each week. Instruction may include training in voice, pitch control, articulation (speech sounds), and loudness control. (Therapist's recommendation, NCPH-101)</td>
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<tr>
<td>NCPH-103</td>
<td>Speech Therapy III</td>
<td>0860-103</td>
<td>This course is designed to help students improve their speech. Special tests allow the teacher to evaluate individual needs. Students meet with a speech instructor for two hours per week and practice in the laboratory for one hour each week. Instruction may include training in voice, pitch control, articulation (speech sounds), and loudness control. (Therapist's recommendation, NCPH-102)</td>
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<td>Class 2, Lab 1, Credit 2 (F, W, S)</td>
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<tr>
<td>NCPH-115</td>
<td>Pronunciation A</td>
<td>0860-115</td>
<td>Students practice pronunciation of vocabulary through the use of Merriam-Webster Dictionary and knowledge of pronunciation rules. (Speech score of 2.0-3.5)</td>
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<td>Class 2, Lab 1, Credit 2 (F, W, S)</td>
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<tr>
<td>NCPH-116</td>
<td>Pronunciation B</td>
<td>0860-116</td>
<td>Students practice independent pronunciation of vocabulary through the use of Merriam-Webster Dictionary and knowledge of pronunciation rules. (Speech score higher than 3.5)</td>
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<td>Class 2, Lab 1, Credit 2 (F, W, S)</td>
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<tr>
<td>NCPH-120</td>
<td>Speech and Listening Lab I</td>
<td>0860-120</td>
<td>This course is appropriate for students who wish to improve articulation, listening, and self-monitoring skills. Students meet with a speech instructor to establish goals. Students work individually at their own pace using a variety of prerecorded audiotapes. The speech instructor monitors students and provides feedback. (Speech scores higher than 3.5, auditory reception score higher than 16 percent)</td>
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<td>Class 2, Lab 1, Credit 2 (F, W, S)</td>
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<tr>
<td>NCPH-121</td>
<td>Speech and Listening Lab II</td>
<td>0860-121</td>
<td>This course is a continuation of Speech and Listening Lab I. Students continue to work on speaking and listening skills. (Recommendation from instructor of NCPH-120)</td>
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<td>Class 2, Lab 1, Credit 2 (F, W, S)</td>
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NCPH-137  Spoken Language Learning II/A
Registration #0860-137
This course focuses on using English correctly in the organization and expression of personal experiences. Practice is provided in some common complex sentence forms. This course uses the self-instruction laboratory for speech and speechreading practice. (NCPH-136)
Class 2, Lab 1, Credit 2 (W)

NCPH-138  Spoken Language Learning I/B
Registration #0860-138
This course focuses on the use of spoken English to express information effectively. Students who have some intelligible speech practice basic patterns of English structures, including asking and answering questions and conveying basic information and brief descriptions. (Speech score higher than 3.0, California Reading Test score of 7.1-8.5)
Class 2, Lab 1, Credit 2 (F)

NCPH-139  Spoken Language Learning I/B
Registration #0860-139
This course focuses on using English correctly in the organization and expression of personal experiences. Practice is provided in some common complex sentence forms. (NCPH-138)
Class 2, Lab 1, Credit 2 (W)

NCPH-140  Spoken Language Learning I/C
Registration #0860-140
This course focuses on the use of spoken English to express information effectively. Students who have some intelligible speech practice basic patterns of English structures, including asking and answering questions and conveying basic information and brief descriptions. (Speech score higher than 3.0, California Reading Test score higher than 8.5)
Class 2, Lab 1, Credit 2 (S)

NCPH-160  Interpersonal Communication
Registration #0860-160
This course helps students become aware of the communication process and their role in it. Students examine their communication skills and evaluate how successfully they communicate expressively and receptively. Students develop strategies to help them take control and communicate effectively in social and employment situations. Some traditional interpersonal communication concepts are discussed, including first impressions, opinions, points of view, clarification of information, problem solving, anger, assertiveness, and consideration. Classes include lectures, discussions, laboratories, films and videos, and role playing. (Recommendation of speech pathologist)
Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-162  Building Relationships Through Communication/A
Registration #0860-162
This course helps students develop effective interpersonal communication skills and confidence. Students come to understand related concepts and develop skills in the following areas: first impressions, perception, self-disclosure, provision and use of feedback, listening, sharing opinions, conflict resolution, and assertiveness. An experiential approach is used, including structured experiences, role playing, and journal writing. (Speech score lower than 3.0)
Class 2, Credit 2 (F, W, S)

NCPH-163  Building Relationships Through Communication/B
Registration #0860-163
This course helps students develop effective interpersonal communication skills and confidence. Students come to understand related concepts and develop skills in the following areas: first impressions, perception, self-disclosure, provision and use of feedback, listening, sharing opinions, conflict resolution, and assertiveness. An experiential approach is used, including structured experiences, role playing, and journal writing. (Speech score higher than 3.0)
Class 2, Credit 2 (F, W, S)

NCPH-170  Group Presentation
Registration #0860-170
This course helps students improve their ability to search for, organize, and present information to groups. It includes topic selection, library research, organizing, outlining written reports, and making presentations to an audience. Activities include a library tour, discussions, evaluations of speeches, and information regarding interpreting. (Speech score higher than 3.5, California Reading Test score higher than 7.0)
Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-171  Public Speaking
Registration #0860-171
This course is designed to refine and increase presentation ability by giving further experience in researching and organizing information for presentation to different audiences. Presentations focus on topics related to hearing impairment and its effect on communication, psychosocial development, and habilitation. Students can serve as presenters representing NTID. The course is highly recommended for students enrolled in social work and those preparing for managerial positions. Students should have some experience in public speaking before taking this course. (Speech score higher than 4.0, California Reading Test score higher than 10.0)
Class 2, Lab 1, Credit 2 (W, S)

NCPH-172  Group Discussion Techniques
Registration #0860-172
This course develops an awareness of group process and interaction. It introduces the principles and techniques necessary for successful communication in group discussions and other complex situations (e.g., interviewing). Group dynamics and leading and participating in groups are taught. Topics for group discussions include social and job-related situations. (Speech score higher than 4.0, speechreading score [with or without sound] higher than 65 percent, California Reading Test score higher than 9.0)
Class 2, Credit 2 (F, W, S)

NCPH-175  Improving Your Conversations A
Registration #0860-175
This course provides information and practice designed to improve students' effectiveness and comfort in auditory-oral conversations in English. Students learn what takes place in a conversation and how it is affected by communication skills; analysis of the partner and situation; and interactive skills, such as turn-taking and clarifying. Students discuss and practice the dynamics of a conversation, including how to initiate topics, maintain and change topics, and successfully close conversations. Students participate in the on-going evaluation of their conversational strengths and weaknesses and focus on improving their effectiveness when conversing with nonsigning partners. (Speech score of 3.0-3.9, speechreading score [with or without sound] higher than 34 percent. Speech therapy should be completed prior to enrollment whenever possible)
Class 2, Lab 1, Credit 2 (F, W, S)
Technical and Integrative Communication Studies

NCPH-176 Improving Your Conversations B
Registration #0860-176
This course provides information and practice designed to improve students' effectiveness and comfort in auditory-oral conversations in English. Students learn what takes place in a conversation and how it is affected by communication skills; analysis of the partner and situation; and interactive skills, such as turn-taking and clarifying. Students discuss and practice the dynamics of a conversation, including how to initiate topics, maintain and change topics, and successfully close conversations. Students participate in the on-going evaluation of their conversational strengths and weaknesses. They will focus on expanding their conversational repertoire and skills when conversing with nonsigning partners. (Speech score higher than 3.9, speachreading score [with or without sound] higher than 60 percent. Speech therapy should be completed prior to enrollment whenever possible)
Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-177 Strategies to Aid Functional Communication
Registration #0860-177
This course is suitable for students who want to develop and practice receptive and expressive strategies to aid in oral/aural communication with a non-signing person. Students develop strategies for communicating in specific dialogue situations, such as renting an apartment and ordering food in a restaurant. Class activities focus on speaking, speechreading, and using strategies in specific functional situations. Laboratory work includes viewing videotapes and practicing speech. Students produce and critique videotapes of simulated situations. Journals are used to describe out-of-class conversational practice. (Speech score of 1.9-3.1, speechreading score [with or without sound] higher than 34 percent, Michigan Test score higher than 50. This course is not appropriate for students with severe voice disorders as noted by a speech-language pathologist)
Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-178 Communication for the Job Interview: Speaking
Registration #0860-178
This course focuses on improving the communication aspect of the job interview through a series of practice interviews. It is for students who have difficulty communicating during an interview. The focus of this course is on using speech effectively. Students with some speech skills and who prefer to use them during an interview are appropriate for this course. Communication for the Job Interview: Writing, offered through the audiology department, is available for students who prefer to use writing during an interview. (Completed one year in program, speech score higher than 3.0, NGGE-101)
Class 2, Lab 1, Credit 2 (W, S)

NCPH-399 Independent Study
Registration #0860-399
This course is designed for students with special needs that cannot be met by another communication course. Students are required to write a contract describing what the course will cover and their responsibilities. The contract must be signed by the student, instructor, and chairperson. Students interested in this course should talk to their communication advisor.
Credit 1-4 (F, W, S)

Center for Sign Language and Interpreting Education

Educational Interpreting

NITT-110 American Sign Language I
Registration #0870-110
This course concentrates on the development of conversational fluency in ASL. Students learn to accurately recognize and produce ASL with appropriate nonmanual behaviors and grammatical features. (Pre-AAS)
Class 4, Credit 4 (F, W, S)

NITT-112 Aspects and Issues of Deafness I
Registration #0870-112
This course surveys the audiological, psycho-social, and developmental aspects of varying degrees of deafness and hearing impairment.
Class 3, Credit 3 (F, W, S)

NITT-114 Intercultural Communication for Interpreters
Registration #0870-114
This course provides students with an introduction to the concepts of culture, communication, and intercultural communication as they relate to interpreters.
Class 3, Credit 3 (F, W, S)
This introductory course focuses on the process of taking a signed message and conveying it into spoken English. Topics include the voice interpreting process, vocal control, topic preparation, message analysis, voicing techniques, feedback strategies, and managing interpreting interactions. (NITT-120)

Class 4, Credit 3 (F, W, S)

NITT-214 Professional Interpreter

Registration #0870-214

This course is designed to give students an overview of the research and development of tutor/notetaking programs and to develop students' tutor/notetaking skills. Tutor/notetaking provision in various educational levels as well as aspects of tutor/notetaking management are studied. (NITT-112)

Class 3, Credit 3 (F, W, S)

NITT-215 Voice Interpreting II

Registration #0870-215

This is the second course in a three-course sequence that focuses on the process and performance of voice interpreting. Topics include topic preparation, vocal control, visible-to-spoken oral interpreting, team interpreting, and critique of voice interpreting skills. (NITT-135)

Class 4, Credit 3 (F, W, S)

NITT-216 Transliteration I

Registration #0870-216

This course is the first in a two-course sequence that develops the ability to present a spoken message into a signed message while retaining English word order and rendering an equivalent message. Coursework includes analysis of English vocabulary and structure for conveying an accurate message, development of use-of-space techniques to enhance message clarity, sign vocabulary, and fingerspelling. This course also addresses the areas of critiquing, assignment preparation, and knowledge of target audience. (NITT-120, 131)

Class 4, Credit 3 (F, W, S)

NITT-217 Oral Transliteration

Registration #0870-217

This course concentrates on the theory and skill of expressive oral transliteration. Students develop the skill of receiving a message and reproducing it in a highly visual modality by applying the principles of clear speech production and support techniques. Students also receive instruction in voicing for deaf and hard-of-hearing people who rely on speech and lipreading. Emphasis is placed on speech production principles, facial expression, natural gestures, body language, and speed of transmission. (NITT-112, 124)

Class 4, Credit 3 (F, W, S)
Sign Communication

NCPX-101 Sign Communication I
Registration #0863-101
This course is designed to assist students with no previous sign communication skills in developing both receptive and expressive skills in basic American Sign Language (ASL) and natural sign English for both academic and social environments. The course includes conversational vocabulary, grammatical principles, and cultural aspects of the deaf community. Also, strategies for use of sign language and speech together are discussed and practiced. (Sign Instruction Placement Interview [SIPI] rating of 1 or Language Background Questionnaire [LBQ] rating of 1 or 2)
Class 2, Credit 2 (F, W, S)

NCPX-103 Sign Communication II
Registration #0863-103
This course is designed to assist students in continuing their development of both receptive and expressive skills in ASL and natural sign English for academic and social settings. The course strengthens students' skills and knowledge with additional conversational sign vocabulary, grammatical principles, and cultural aspects of the deaf community. The focus is on developing expressive and receptive skills in dialogues and short presentations. Practice in using sign language and speech together is included. (SIPI 2 or grade of C or better in NCPX-101)
Class 2, Credit 2 (F, W, S)

NCPX-105 Sign Communication III
Registration #0863-105
This course is designed to assist students in continuing their development of receptive, expressive, and conversational skills in advanced ASL and natural sign English for both academic and social settings. The course continues to strengthen students' skills and knowledge with advanced vocabulary, grammatical principles, and cultural aspects of the deaf community. The focus is on the development of receptive skills in dialogues and presentations. Continued practice with use of sign language and speech together is included. (SIPI 3 or grade of C or better in NCPX-103)
Class 2, Credit 2 (F, W, S)
NCPX-111  American Sign Language for Sign English Users
Registration #0863-111
This course is designed to assist students who use sign English in developing expressive and receptive ASL skills. Study of ASL historical, cultural, and linguistic information is included. (SIPI 3 or 4 or grade of C or better in NCPX-105)
Class 2, Credit 2 (F, W, S)

NCPX-131  Signing Basic English Idioms
Registration #0863-131
This course is designed to assist students in developing their skills in using natural sign English and ASL to receive and express English idioms. Also, strategies for effective use of these sign skills to assist in reading and writing English idioms are discussed and practiced. (SIPI of 4 or 5 or LBQ 4 or 5, English status: Marginally Qualified [MQ] or Preparatory [PP])
Class 2, Credit 2 (F, W, S)

NCPX-133  Signing Idiomatic English
Registration #0863-133
This course is designed to assist students in developing their skills in using natural sign English and ASL to receive and express English idioms. Also, strategies for effective use of these sign skills to assist in reading and writing English idioms are discussed and practiced. (SIPI of 4 or 5 or LBQ 4 or 5, English status: Proficient [PF] or Provisionally Qualified [PQ])
Class 2, Credit 2 (F, W, S)

NCPX-135  Public Presentations
Registration #0863-135
Students learn to specify a topic; research, organize, and present ideas; write an outline; and present from an outline using sign language and simultaneous communication as appropriate. Students also learn to communicate with a variety of audiences through the use of media and interpreters. Students present speeches designed to inform, demonstrate, and persuade. (SIPI of 4 or 5 or LBQ 4 or 5, California Reading Test score higher than 7.5)
Class 2, Credit 2 (F, W, S)

NCPX-141  Understanding American Sign Language as a Language
Registration #0863-141
This course is designed to assist students in developing basic knowledge about the linguistic structure of ASL. Also, basic information about the historical and cultural aspects of ASL is introduced and discussed. (SIPI of 5, Michigan Test score higher than 60)
Class 2, Credit 2 (F, W, S)

NCPX-145  Linguistics of Sign Communications
Registration #0863-145
This course is designed to assist students in developing basic knowledge of the grammar and structure of the range of sign communications systems, from American Sign Language (ASL) to invented English sign systems. Also included is discussion of the developmental roots of these sign systems and their purposes and usual environments. (SIPI of 4 or 5, LBQ 4 or 5, or grade of C or better in NCPX-111)
Class 2, Credit 2 (F, W, S) Class 3, Credit 3 (W)

NCPX-151  Sign Language Interpreting: Consumer Awareness
Registration #0863-151
This course is designed to assist students in becoming better educated consumers of interpreting services. Aspects of interpreting discussed include: history of the Registry of Interpreters for the Deaf (RID); RID Code of Ethics; roles, rights, and responsibilities of all people involved in interpreting situations; laws relating to interpreters and services; pay scales for interpreters; and types of interpreting (oral, manual, combined, simultaneous, and consecutive). Practicum experience is provided. (SIPI 3, 4, or 5 or LBQ 4 or 5)
Class 2, Credit 2 (F, W, S)

NCPX-161  Introduction to Sign Language Teaching
Registration #0863-161
Students are given an overview of how languages traditionally have been taught as well as current methods and theories and their applications to the teaching of sign language. Students practice basic teaching techniques, selecting appropriate materials, designing curriculum and evaluations, teaching cultural information, and including grammatical features in lessons. Students learn about resources to support their efforts to teach sign language. (SIPI 4 or 5, NCPX-141 or NCPX-145)
Class 2, Credit 2 (F, W, S)

NCPX-163  Practicum in Teaching
Registration #0863-163
This course is designed to strengthen students’ knowledge of sign language teaching skills. Students observe sign language classes taught by faculty members in the sign communication program and instructors from the Rochester community. Students participate in class planning, teaching, and evaluation activities as teaching assistants, sign language tutors to faculty and staff members, or as teachers in the RITSIGN program. (SIPI 4 or 5, completion of NCPX-161)
Class 2, Credit 2 (F, W, S)

NCPX-399  Independent Study
Registration #0863-399
This course is designed for students with special needs not met by other sign communication courses. Students are required to write a contract describing what the course will cover. The contract must be signed by the student, instructor, and chairperson. Students interested in this course should consult their communication advisor.
Credit 1-4 (F, W, S)
Division of General Education Programs

General Education

**Required Courses**

**NGGE-100 or NAPS-100** Freshman Seminar
**Registration #0847-100 or #0853-100**

This course is designed to provide entering students with opportunities to enhance intellectual, academic, personal, social, and ethical decision-making skills in order to maximize their college experience. Students have opportunities to explore and negotiate the college environment, expand critical thinking skills, learn and use academic skills, confront questions of identity and social roles, and deal with ethical issues with faculty members and senior-level students who serve as mentors.

Class 3, Credit 2 (F, W)

**NGGE-101** Job Search Process
**Registration #0847-101**

This course is designed for students who are preparing for their first co-op experience or permanent job. Students learn about resume writing, employment letters, sources of employment information, job applications, interviews, and ways to find a job. Learning activities include lectures and written assignments.

Class 2, Credit 1 (F, W)

**NGGE-102** Contemporary Life Issues
**Registration #0847-102**

This course focuses on life issues and social problems. Students have an opportunity to broaden their understanding of themselves and society and develop survival skills to assist them in the transition from college to the wider community. One topic from each of the four content areas is covered from an individual and social perspective. This course is designed for students completing certificates, diplomas, and AOS degrees. AOS degree students who have completed the three Human Experience courses (NGGE-166, 167, and 168) may choose to take Contemporary Social Issues (NGGE-202) instead of this course.

Class 2, Credit 2 (F, W, S)

**NGGE-201** European History
**Registration #0847-201**

This course is an introduction to political, social, and cultural history from 1600 through the 20th century and serves as a bridge to Modern European History offered in the College of Liberal Arts. Emphasis is placed on the major historical developments that have influenced the development of modern Europe.

Class 3, Credit 3 (W)

**NGGE-202** Contemporary Social Issues
**Registration #0847-202**

This course focuses on social issues. Students apply the knowledge and skills learned in College of Liberal Arts courses to understanding current social issues and their impact on individuals and society. One topic from each of the eight content areas (personal/social problems, ethics, racial and other minority issues, peace and war, economic issues, political and public policy issues, environmental issues, and deaf community issues) are covered in class from individual, social, and political perspectives. This course is designed for AAS degree students who have completed three Liberal Arts courses. AOS degree students who have completed the three Human Experience courses (NGGE-166, 167, and 168) may choose to take this course instead of Contemporary Life Issues (NGGE-102).

Class 2, Credit 2 (F, W, S)

Elective Courses

**Fine Arts and Humanities**

**History**

**NGGE-148** Deaf Heritage
**Registration #0847-148**

This course examines many topics related to deafness. Students survey "the deaf experience" from ancient times to the present by tracing the social and cultural heritage of deaf people and by examining important events and developments. Deaf individuals who have made important and remarkable contributions and achievements also are studied.

Class 3, Credit 3 (F, W, S)

**NGGE-149** American Past
**Registration #0847-149**

This course gives students an understanding of American history, beginning in 1607 and continuing through the 20th century. It introduces students to a history of the country's past (heritage) and helps prepare them for the personal responsibilities of good citizenship in contemporary society.

Class 3, Credit 3 (F, W, S)

**NGGE-201** European History
**Registration #0847-201**

This course is an introduction to political, social, and cultural history from 1600 through the 20th century and serves as a bridge to Modern European History offered in the College of Liberal Arts. Emphasis is placed on the major historical developments that have influenced the development of modern Europe.

Class 3, Credit 3 (W)

**NGGE-204** Perspectives on World Events
**Registration #0847-204**

This course examines the major news events as they occur through identification of underlying issues and their historical foundations.

Class 3, Credit 3 (F)

**Language and Literature**

**NGGE-215** Introduction to Dramatic Literature
**Registration #0847-215**

This course provides a basic introduction to dramatic literature as well as a bridge to the study of dramatic literature in the College of Liberal Arts. It introduces students to the play script as literature and to play script analysis, focusing on vocabulary and basic skills.

Class 3, Credit 3 (F)

**NGGE-216** Introduction to Prose Literature
**Registration #0847-216**

This course serves as a survey course for students desiring a basic knowledge of prose fiction and nonfiction and as a bridge to the study of prose in the College of Liberal Arts. It introduces students to the genres of the short story, novel, autobiography, and essay.

Class 3, Credit 3 (W)
Interdisciplinary

NGGE-166 The Human Experience: An Individual Life
Registration #0847-166
This course introduces the major challenges faced by human beings throughout the life cycle. It explores the factors that affect healthy and unhealthy adjustments to the circumstances of an individual's life, including biological inheritance, thoughts, feelings, and environment. Students examine contemporary issues related to the challenges of adolescence, adulthood, and old age in order to understand how unconscious adjustment and conscious decision making help in attaining and maintaining psychological health. Selected contemporary issues are explored through self-reflection; group discussions; writing; examination of scientific, literary, and periodical materials; guest speakers; and campus and community activities. Alternative solutions to life's challenges are generated, shared, and evaluated by students. Through these experiences, students are introduced to the knowledge, communication skills, and critical-thinking skills important for making responsible decisions throughout their adult lives. This course is required for AOS degree students. (Permission of department chairperson or instructor)
Class 4, Credit 4 (F, W, S)

NGGE-167 The Human Experience: The Individual and Society
Registration #0847-167
This course focuses on the individual's relationships with others, starting from a study of primary groups and moving through a study of secondary groups (peers, school, work, and citizenship groups) to a study of world awareness and responsibility. The course involves the perception and evaluation of values, morals, ethics, human rights, and responsibilities. The study of selected social issues is accomplished through self-reflection, group and panel discussions, reading of periodicals and teacher-created materials, and participation in campus and community activities. Students are introduced to the knowledge, communication skills, and critical thinking skills important for making responsible decisions throughout their lives. This course is required for AOS degree students. (NGGE-166)
Class 4, Credit 4 (F, W, S)

NGGE-168 The Human Experience: The Individual and Technology
Registration #0847-168
This course explores the social, political, economic, and ethical dimensions of the relationship between the individual and technology in modern society. It provides a specific focus for the application of the general understanding of human development, society, and the possibilities for personal self-determination that students acquire in The Human Experience: An Individual Life and The Human Experience: The Individual and Society. Drawing on this knowledge and using the skills in communication and critical thinking that they have developed, students analyze selected current issues that affect their lives, present and future, and develop a course of responsible actions based on their analysis. This activity will be grounded in a consideration of the nature of science and technology, the role of human values in determining the course of scientific inquiry and the social uses of technology, and some major areas of controversy in this field. This course is required for AOS degree students. (NGGE-167)
Class 4, Credit 4 (F, W, S)

Religion

NGGE-145 The Bible as Literature: A Cultural and Historical Perspective
Registration #0847-145
This course provides a basic understanding of the contents of the Bible. It presents some of the major events and themes, and focuses on the cultural and historical circumstances in which the biblical literature grew. Students with a variety of religious interests may take this course. The course does not approach the literature from any particular belief or lack thereof.
Class 2, Credit 2 (F)

NGGE-150 Our Judeo-Christian Heritage
Registration #0847-150
This course gives students an understanding of the historical and literary roots of two major religions of the world, Judaism and Christianity. The foundations of Western culture also are explored. A study of these roots begins with a geographical and sociological view of the Ancient Near East 6,000 years ago and continues with a study of factors that encouraged the later development of Jewish/Christian religious thought and understanding. Students have an opportunity to become more familiar with their own heritage so that they can better form values, opinions, and answers to religious questions in their own lives.
Class 2, Credit 2 (F, W, S)
Mathematics and Science

NGGE-220 or NAPS-220 Reading and Thinking in Science
Registration #0847-220 or #0853-220
This course is offered to cross-registered science and engineering students who are interested in raising their academic achievement level and to other students who wish to improve their skills and increase their knowledge in these areas. The course helps students evaluate their strengths and weaknesses in areas of thinking such as comparing, analyzing, reasoning, and problem solving. With an emphasis on making thinking overt, strategies are modeled and practiced. Expansion of both background knowledge and scientific vocabulary are additional benefits.

Class 3, Credit 3 (S)

Social Science

Economics and Political Science

NGGE-106 Personal Finance
Registration #0847-106
This course introduces students to basic money management. Topics for in-depth discussion are based on student interest and selected from the areas of income tax, banking, credit, budgeting, inflation, and shopping wisely to save money.

Class 2, Credit 2 (F, W, S)

NGGE-203 Economic Basics
Registration #0847-203
This course serves as a bridge to Introduction to Economics offered in the College of Liberal Arts. It is designed to introduce students to basic background knowledge in economic concepts and methods of analysis. Emphasis is placed on the application of basic methods of economic analysis, economic theories, and contemporary economic issues of the United States. (NTMM-142 or the equivalent is recommended)

Class 3, Credit 3 (S)

Psychology

NGGE-105 or NAPS-105 Learning Strategies
Registration #0847-105 or #0853-105
This course is designed to help students evaluate their strengths and weaknesses and to improve their learning efficiency and effectiveness through appropriate training. Students have the opportunity to improve their learning skills in areas such as reading, test taking, questioning, and general study habits. Activities include lectures, discussions, and individual conferences.

Class 2, Credit 2 (F, W, S)

NGGE-108 Drug and Alcohol Usage
Registration #0847-108
This course is designed to give a general overview of various drugs commonly used among college-age populations. Upon completion of this course, students should be able to identify and describe the effects on the body, both short- and long-term, from using each drug covered; classification; dependence; and tolerance. Students study the following drug-related topics: social impact, peer pressure, economy of drugs, and personal values related to drugs.

Class 2, Credit 2 (F, W, S)

NGGE-109 Adjusting to Deafness
Registration #0847-109
This course is designed to assist students who are postlingually deafened, individuals who prefer using an oral method of communication and have had little or no contact with other hearing-impaired people, and prelingually deaf people who have grown up in hearing environments. The course covers topics about deafness, including social issues, how deafness affects individuals and their families, and ways that an individual adjusts to deafness.

Class 2, Credit 2 (F, W, S)

NGGE-111 Basic Human Sexuality
Registration #0847-111
This course provides information and helps students understand human sexuality. Topics addressed include feelings and attitudes toward sexuality, values, and sensitivity to the feelings of others.

Activities include lectures, discussions, and projects.

Class 3, Credit 2 (F, W, S)

NGGE-113 Psychology and Your Life
Registration #0847-113
This course presents a life-stages model of human development that emphasizes psychological aspects of development, including emotional, self-concept, and interpersonal relationship development. Students use this model to identify important life issues for themselves and others and also to better understand their own behavior as well as that of children, teenagers, parents, and older people.

Class 3, Credit 3 (F, W, S)

NGGE-114 Early Childhood and Parenting
Registration #0847-114
The purpose of this course is to help prepare college-age deaf students for the responsibilities and pleasures that come with parenthood. Students are introduced to such important topics as conception, labor, delivery, care of the newborn, and other issues of importance during the first three years of life. This course focuses on common issues faced by all parents, with special consideration given to issues unique to deaf parents in raising their hearing or deaf children.

Class 3, Credit 3 (F, W, S)

NGGE-126 Leadership Development
Registration #0847-126
This course helps students develop managerial/leadership skills. A required project and class activities assist them in improving leadership skills. Course topics include one- and two-way communication, group leadership and followership, styles of leadership, delegating responsibility, planning skills, helping behaviors, establishing goals, and problem-solving techniques.

Class 2, Credit 2 (F, W, S)

NGGE-146 Psychology of Religion
Registration #0847-146
This course is designed to help students understand how religion may relate to their lives and how they can develop a mature, reflective, and critical view of religion as a life influence. Topics for study include religion as a type of human behavior, methods of studying religious experiences, the psychology of conversion, mysticism, and human development in religious understanding and practice.

Class 2, Credit 2 (S)
NGGE-161 Career Decision Making
Registration #0847-161
This course, designed for students who are not sure about their educational and career goals, teaches them how to plan careers and lives. Work is on an individual or small-group basis. Activities include independent study, field trips, role playing, lectures, and discussions.
Class 2, Credit 2 (F, W, S)

NGGE-163 Interpersonal Relationships on the Job
Registration #0847-163
This course teaches students the importance of good work relationships to careers. Topics include employer-employee relationships, co-worker relationships, and how work relationships affect job satisfaction. Activities include role playing, discussions, and presentations.
Class 2, Credit 2 (F, W, S)

Sociology and Anthropology

NGGE-112 Love, Marriage, and the Family
Registration #0847-112
This course examines the potentials and problems of married life. Students are introduced to such relevant topics as love, sexuality, singlehood, marital roles, conflict resolution, and parenting. The course challenges students to recognize their rights and responsibilities in relationships and offers them opportunities to clarify their thinking with peers and faculty members.
Class 3, Credit 3 (F, W, S)

NGGE-127 Community Service I
Registration #0847-127
This course is designed to give students an opportunity to learn some basic helping skills and to use these skills in a supervised community service experience. Students explore different volunteer and professional helping roles and use this information to make personal and career choices. Activities include lectures, discussions, volunteer service, and individual conferences.
Class 2, Credit 2 (F, W, S)

NGGE-147 Law and Society
Registration #0847-147
This course is designed to assist students in understanding the basic rules and applications of practical law as it applies to personal rights and responsibilities. Topics covered are how laws affect a society, civil rights, legal rights, torts, marriage, family relations, and criminal law. Activities include lectures and field trips.
Class 2, Credit 2 (F, W, S)

Theater

NGGT-100 Technical Theater I
Registration #0848-100
This course covers the methods and materials used in technical theater. Topics include scenery construction, properties, and the responsibilities of different theater personnel. Activities include lectures, demonstrations, discussions, and involvement in theater productions.
Class 2, Credit 2 (F, W, S)

NGGT-101 Technical Theater II
Registration #0848-101
This is a course for students who want to learn more about technical theater. Activities include independent projects, supervision of crews, and shopwork. (NGGT-100)
Class 2, Credit 2 (F, W, S)

NGGT-102 Stage Lighting
Registration #0848-102
This course introduces students to theater lighting and teaches them how to use each piece of lighting equipment. Activities include hanging lights for plays, running the light board, and using color in lighting. (NGGT-100)
Class 2, Credit 2 (F, W, S)

NGGT-120 Acting I
Registration #0848-120
This course explores communication by using pantomime, sign mime, body language, facial expression, character study, and role playing. Students learn to perform in front of an audience with confidence and skill.
Class 2, Credit 2 (F, W, S)

NGGT-121 Acting II
Registration #0848-121
This course helps students perfect acting skills. Activities include advanced character development and preparation of scenes with a partner. (NGGT-120, permission of instructor)
Class 2, Credit 2 (F, W, S)

NGGT-130 Introduction to Theater
Registration #0848-130
This course, designed to teach students about theater production, encourages them to take part in theatrical experiences while they learn about acting, writing, directing, and designing (lights, scenery, costumes, make-up). Activities include lectures, demonstrations, and discussions.
Class 2, Credit 2

NGGT-131 Creative Translation into Sign Language
Registration #0848-131
This course covers translation forms used by the department of performing arts. Students learn to translate stories, poems, and plays into American Sign Language. They also learn to present their translated works in sign. Activities include lectures, discussions, drills, and group workouts.
Class 2, Credit 2

NGGT-132 Sign Mime
Registration #0848-132
This course teaches students to translate plays, poems, and stories into sign mime. Topics include how to develop and use sign mime in theater and how to express original ideas in sign mime. Activities include lectures, demonstrations, and a laboratory.
Class 2, Credit 2

NGGT-133 Theater Practicum
Registration #0848-133
This course is for students who are accepted for a role (performance or crew) in a faculty-directed theater production. Acting students analyze a script, develop a character, rehearse, memorize, and perform. Crew students build a specific scene or costume element and serve as members of the running crew. This course may be taken more than once.
Class 3-8, Credit 1-3

NGGT-140 Dance Performance I
Registration #0848-140
This course teaches students the basic terminology and techniques of modern dance. Basic body structure and creative movement are studied by the class. Individuals and groups perform in the studio. Activities include lectures, demonstrations, exercises, and performances.
Class 2, Credit 2 (F, W, S)
NGGT-141 Dance Performance II  
**Registration #0848-141**  
This intermediate-level modern dance course teaches technique, group work, and performance standards. Activities include lectures, discussions, exercises, and performances. (NGGT-140, dance experience, or permission of instructor)  
Class 2, Credit 2 (F, W, S)

NGGT-142 Sign Dance  
**Registration #0848-142**  
In this basic dance class that includes warm-up, barre, center, and cross-the-floor movement, sign language and modern dance become the basis from which students make compositions. Students do not need to know sign language to take the course. Activities include lectures, demonstrations, and performances.  
Class 2, Credit 2

NGGT-143 Special Topics in Dance  
**Registration #0848-143**  
This course teaches different styles of dance. Possible topics include Afro-Caribbean dance, ballet, jazz, and tap. This course may be taken more than once.  
Class 2, Credit 2

NGGT-150 Music Introduction/Instruction Practicum  
**Registration #0848-150**  
This course helps students develop musical skills in one or more of the following areas: piano, guitar, electric bass, percussion, brass, woodwinds, strings, organ, and voice. Students may begin with basic instruction and progress to more advanced levels. Lessons are offered on an individual or small-group basis. This course may be taken more than once.  
Class 2, Credit 2 (F, W, S)

NGGT-399 Independent Study  
**Registration #0848-399**  
Class 3-9, Credit 1-3

**Pre-Baccalaureate Studies**

**College of Liberal Arts Courses**

**Criminal Justice**

GCJC-201 The Criminal Justice System  
**Registration #0501-201**  
The principles of the criminal justice system as well as administration and management within various agencies, including the relationship of the police to the courts and the courts to the probation, correction, and parole functions, are studied. Consideration also is given to specific problems within the branches of the criminal justice system.  
Class 3, Credit 4 (offered annually)

GCJC-203 Criminology  
**Registration #0501-203**  
A survey of the field of criminology with emphasis on major forms of contemporary crime, definition of crimes and criminality, theories of criminality, the extent of crime, criminal typologies, and fundamental aspects of the social control of crime.  
Class 3, Credit 4 (offered annually)

**Language, Literature, Communication**

GLLC-220 English Composition  
**Registration #0502-220**  
This course develops the language skills needed to write effectively. It should be taken in the freshman year.  
Class 3, Credit 4 (F, W, S, Su)

**Social Work**

GSWS-210 The Professional Social Work Role  
**Registration #0516-210**  
This course explores social work as a profession, the various fields in which social workers practice, and the differing job philosophies of human services and social work approaches. Also covered are strategies for developing self-awareness and professional self-assessment.  
Class 3, Credit 4 (F)

GSWS-212 Self-Awareness in the Helping Role  
**Registration #0516-212**  
This course helps to develop students’ helping skills in essentially three broad areas: skills in noticing or observing; observing one’s professional use of self in the helping relationship and evaluating the appropriateness of such behavior; and observing the client and evaluating the effect one’s response has on her/him. Students are expected and required to increase their awareness skills, and this course offers a unified learning experience where students can concentrate on the theory and practice of awareness skills.  
Class 3, Credit 4 (W)

**Pre-Baccalaureate Studies**

**College of Science Courses**

**Biology**

SBIB-201 General Biology  
**Registration #1001-201**  
The course describes the characteristics and origin of life; basic principles of modern cellular biology, including cell organelle structure; chemical basis and functions of life, including enzyme systems, cellular respiration, and photosynthesis; nutrient procurement in plants and animals. (Corequisite: SBIB-205)  
Class 3, Credit 3 (F)

SBIB-202 General Biology  
**Registration #1001-202**  
This course is a study of the physiological processes of gas exchange, internal transport, osmoregulation, excretion, and hormonal control in plants and animals; nervous system and behavior in animals. (Corequisite: SBIB-206)  
Class 3, Credit 3 (W)
SBIB-203 General Biology
Registration #1001-203
This course includes a study of cellular and organismal reproduction, the principles of genetics and developmental biology, introduction to evolution and ecology. (Corequisite: SBIB-207)
Class 3, Credit 3 (S)

SBIB-205,206,207 General Biology Laboratory
Registration #1001-205, 206,207
Laboratory work complements the lecture material of General Biology (SBIB-201, 202, 203). The experiments are designed to illustrate concepts, develop laboratory skills and techniques, and improve students' ability to make, record, and interpret observations. (Corequisites: SBIB-201 for SBIB-205; SBIB-202 for SBIB-206; SBIB-203 for SBIB-207)
Lab 3, Credit 1 (SBIB-205, F; SBIB-206, W; SBIB-207, S)

Chemistry

SCHA-261 Quantitative Analysis I
Registration #1008-261
This course offers an introduction to quantitative analysis, including experimental error and statistics, solubility and gravimetric analysis, volumetric analysis, acid-base equilibria and pH, acid-base and complexometric titrations. (Corequisites: SCHA-265, SCHA-252)
Class 4, Credit 4 (W)

SCHA-262 Quantitative Analysis II
Registration #1008-262
This course is a continuation of SCHA-261. Fundamentals of electrochemistry, electrodes and potentiometry, redox titrations, electrogravimetric and coulometric analysis, polarography, spectrophotometry, nuclear chemistry, and coordination compounds are discussed. (Corequisites: SCHA-261, 266)
Class 4, Credit 4 (S)

SCHA-265 Quantitative Analysis I Lab
Registration #1008-265
Experimental techniques include using the analytic balance, calibration of glassware, gravimetric determinations, titrations of weak acids and bases, multiple-point titrations, iodometric and EDTA titrations, and Gran plots. Emphasis is on record keeping and report writing. (Corequisites: SCHA-261, SCHA-252)
Lab 6, Credit 2 (W)

SCHA-266 Quantitative Analysis II Lab
Registration #1008-266
Experimental techniques include potentiometric and photometric determinations and titrations, electrogravimetric analysis, determination of equilibrium constant (weak acids). Emphasis is on record keeping and report writing. (Corequisites: SCHA-261, SCHA-262)
Lab 6, Credit 2 (S)

SCHC-251 General Chemistry I
Registration #1010-251
This course includes a detailed study of fundamental tools of chemistry, including properties and measurement, atomic theory, stoichiometry (elements, compounds, reactions), reactions in aqueous solutions, thermochemistry (First Law), and gaseous equilibria. (Corequisite: SCHC-255)
Class 3, Credit 3 (F)

SCHC-252 General Chemistry II
Registration #1010-252
This course describes gas laws, periodic tables and periodic trends, quantum theory of electrons, chemical bonding (ionic, covalent, valence bond theory, and hybridization), chemical kinetics, and introduction to organic chemistry. (Corequisites: SCHA-261,265) (SCHA-251)
Class 3, Credit 3 (W)

SCHC-255 General Chemistry I Lab
Registration #1010-255
A variety of experimental techniques, including determination of Avogadro's number, qualitative analysis, Grub's plot, acid rain, anionic buffers, heats of reaction, and syntheses of aspirin and polymers are conducted. (Corequisite: SCHA-251)
Lab 3, Credit 1 (F)

SCHG-208 College Chemistry I
Registration #1011-208
This 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.
Class 4, Credit 4 (F, W)

SCHG-209 College Chemistry II
Registration #1011-209
This course is a continuation of SCHG-208. Topics include chemical equilibrium, properties of acids and bases, aqueous equilibria, free energy, entropy and equilibrium, electrochemistry, nuclear chemistry, and the chemistry of metals. (SCHG-208)
Class 4, Credit 4 (S)

Mathematics

SMAM-204 College Algebra and Trigonometry
Registration #1016-204
Topics include a review of the fundamentals of algebra; solution of linear, fractional, and quadratic equations; functions and their graphs; polynomial, exponential, logarithmic, and trigonometric functions; and systems of linear equation. (Two years of high school algebra)
Class 4, Credit 4 (F, W, S)

SMAM-214 Introduction to Calculus I
Registration #1016-214
This course is an introduction to the study of differential calculus. Topics covered include functions and graphs, limits, continuity, the derivative and its significance, the algebra of derivatives, chain rule, related rates, and maxima and minima. (SMAM-204 or equivalent)
Class 3, Credit 3 (F, W, S)

SMAM-215 Introduction to Calculus II
Registration #1016-215
This course is a continuation of SMAM-214, focusing on an introduction to integral calculus. Topics include definite integral, area, work, and distance problems; volumes; fundamental theorem of calculus; approximation techniques; exponential and logarithmic functions; applications; and introduction to differential equations. (SMAM-214)
Class 3, Credit 3 (W, S)
SMAM-251 Calculus I
Registration #1016-251
This is the first course in a standard three-course sequence in calculus intended for students majoring in mathematics, science, or engineering with an emphasis on understanding the concepts and using them to solve a variety of physical problems. Topics covered include two-dimensional analytic geometry, functions, limits, continuity, the derivative and its formulas, and applications of the derivative. (Three years of high school mathematics)
Class 4, Credit 4 (F, W, S, Su)

SMAM-252 Calculus II
Registration #1016-252
Topics include anti-derivatives by various methods, the definite integral with applications to calculation of area, arc length, volumes of revolution, transcendental functions, and numerical integration. (SMAM-251)
Class 4, Credit 4 (F, W, S, Su)

SMAM-253 Calculus III
Registration #1016-253
Topics include improper integrals, formal limits of sequences, infinite series, Taylor series, polar coordinates, and conic sections. (SMAM-252)
Class 4, Credit 4 (F, W, S, Su)

Physics

SPSP-200 Physics Orientation
Registration #1017-200
This course is an introduction to the nature and scope of physics for first-year students interested in physics as a profession. Topics include what is physics, professional opportunities in physics, the physics profession, literature of physics, and communicating in physics. Laboratory includes safety instruction, measurement and recording techniques, graphics analysis, error analysis, and report writing. Each student presents a formal written or oral report on some topic of interest at the end of the course.
Class 1, Lab 2, Credit 1 (F)

SPSP-311 University Physics I
Registration #1017-311
This is an intensive course in general physics, using calculus, for majors in the sciences and engineering. Mechanics, kinematics, and dynamics of a particle and of a rigid body; work and energy; momentum and impulse; rotational motion; oscillatory motion, and gravitation are discussed. (Credit or co-registration in SMAM-252) (See SPSP-371 for three-hour lab, SPSP-375 for two-hour lab)
Class 4, Credit 4 (F, W, S)

SPSP-312 University Physics II
Registration #1017-312
Topics include fluids and elastic properties, heat and thermodynamics, wave motion, sound, geometrical and physical optics. (Credit or co-registration in SMAM-253) (SPSP-311) (See SPSP-372 for three-hour lab, SPSP-376 for two-hour lab)
Class 4, Credit 4 (F, W, S)

SPSP-313 University Physics III
Registration #1017-313
Topics include electrostatics, Gauss' Law, electric field and potential, dielectrics, DC circuits, magnetic fields, Ampere's Law, Faraday's Law, inductance and capacitance, magnetism in matter, AC series circuits. (Credit or co-registration in SMAM-253) (SPSP-311, 312) (See SPSP-373 for three-hour lab, SPSP-377 for two-hour lab)
Class 4, Credit 4 (F,W,S)

SPSP-371 University Physics Lab I
Registration #1017-371
This laboratory course includes experiments related to the principles and theories discussed in corresponding lectures. (Credit or co-registration in SPSP-311)
Lab 3, Credit 1 (F, W, S)

SPSP-372 University Physics Lab II
Registration #1017-372
This laboratory course includes experiments related to the principles and theories discussed in corresponding lectures. (Credit or co-registration in SPSP-312)
Lab 3, Credit 1 (F, W, S)

SPSP-373 University Physics Lab III
Registration #1017-373
This laboratory course includes experiments related to the principles and theories discussed in corresponding lectures. (Credit or co-registration in SPSP-313)
Lab 3, Credit 1 (F, W, S)